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KOMITET REDAKCYJNY
Prof. dr Czesław Gerwel — Poznań
Prof. dr Witold Stefański, Członek Korespondent PAN — Warszawa
Prof. dr Wincenty L. Wiśniewski — Warszawa

REDAKTOR
Prof. dr Zdzisław Raabe — Warszawa

ADRES REDAKCJI I ADMINISTRACJI

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Of the Institute of Parasitology of the Polish Academy of Science
and the Institute of Parasitology and Invasion Diseases of the
Agriculture Academy in Warsaw
Head: prof. Witold Stefański, D. Sc., Member of thePolish Academy of Science

Bogdan CZAPLIŃSKI

Hymenolepididae Fuhrmann, 1907 (*Cestoda*) Parasites of Some Domestic and Wild *Anseriformes* in Poland

Hymenolepididae Fuhrmann, 1907 (*Cestoda*) u niektórych domowych i dzikich *Anseriformes* w Polsce

Hymenolepididae Fuhrmann, 1907 (*Cestoda*) паразиты некоторых домашних и диких *Anseriformes* в Польше

To
my dear Master Prof. Witold
Stefański D. Sc., on account of the
fortieth anniversary of his work
for Science.

I. Introduction 176
II. Material 177
III. Methods 177
IV. General Comment 180
V. Systematization 187
VI. On Variability 194
VII. Description of Species in Detail 203
Subfamily *Hymenolepidinae* Perrier, 1897 202
Tribe *Aploparaksaea* Skrjabin et Mathevossian, 1941 203
Genus *Aploparaksis* Clerc, 1903 203
Tribe *Diorchaea* Skrjabin et Mathevossian, 1941 . . 207
Genus *Diorchis* Clerc, 1903 207
Tribe *Hymenolepaea* Skrjabin et Mathevossian, 1941 . 240

Genus *Dicranotaenia* Railliet, 1892 sensu Spassky et Spasskaja, 1954 240
„ *Drepanidotaenia* Railliet, 1892 sensu Spassky et Spasskaja, 1954 248
„ *Echinocotyle* Blanchard, 1891 258
„ *Hymenolepis* Weinland, 1858 s.l. 261
„ *Orlovilepis* Spassky et Spasskaja, 1954 307
„ *Sobolevicanthus* Spassky et Spasskaja, 1954 . 309
„ *Sphenacanthus* Lopez-Neyra, 1942 sensu Spassky et Spasskaja, 1954 332
Subfamily *Fimbriariinae* Wolffhügel, 1900 336
Genus *Fimbriaria* Frölich, 1802 336
Subfamily *Diploposthinae* Skrjabin et Mathevossian, 1941 337
Genus *Diploposthe* Jacobi, 1896 337

VIII. Conclusions 340

IX. References 346

I. Introduction

The object of the present work is an examination of the specific composition of the tapeworms of the family *Hymenolepididae* Fuhrmann, 1907 in domestic and wild *Anseriformes* in Poland. It is meant as an attempt to add to our knowledge of *Hymenolepididae* on the evidence of anatomic examination of some representatives of this systematic group.

Whenever it is being decided just to what species any of the *Hymenolepididae* belongs mistakes may be made not only because there are many similar forms but also because typical descriptions are based on features which show too great a plasticity. In the chapter „On Variability" I tried to enumerate features and arrange them according to the degree of variability. I believe that examination of a large number of specimens of a definite species which come from populations greatly differing in number and of specimens from various species of hosts will allow the properties of mature *Hymenolepididae* to be distinguished more accurately which are of essential importance in the systematization. It is clear that unless we are able accurately to identify a parasite we are not in

a position to examine its influence on the host, let alone embarking upon its suppression.

The object of the present work was suggested to me by Prof. Witold Stefański, D. Sc., whom I think it my pleasant duty heartily to thank here for the much valuable advice and guidance I have received when performing the task assigned to me. I should also like to acknowledge the valuable help I have received from my colleagues, Mr W. Ślusarski, adjunct, Mr. J. Dróżdż, assistant, and Mr. M. Świetlikowski, aspirant, when collecting the material. To Mrs. Danuta Tarczyńska I am indebted for preparing in ink the drawings included to this work.

II. Material

The material that I used to perform the present work consisted of 41.171 tapeworm specimens found in 468 hosts belonging to twelve species and subspecies of *Anseriformes* as listed in Table II (p. 188—190). Three species of hosts do not appear in the table as only a single specimen of each of them was examined, none of them being invaded with tapeworms. These are *Glaucionetta clangula* (L.), *Dafila acuta* (L.) and *Mergus merganser* L. Most tapeworm specimens came from 116 wild ducks shot at Drużno Lake (Mazury) during the collective research on the circulation of parasites in the Drużno Lake biocenosis, directed by Prof. dr W. L. Wiśniewski. I am indebted to Prof. W. L. Wiśniewski for allowing me to use so valuable and numerous materials in my anatomical examination. The other materials I collected from 1950 to 1955 from 352 hosts including 22 wild ducks: *Anas platyrhynchos* (L.), *Nettion crecca* (L.), *Mergus merganser* L., *Glaucionetta clangulua* (L.) shot in the neighbourhood of Warsaw, Radom and Białystok, 100 domestic ducks and 230 domestic geese killed in the poultry slaughter-houses of Lublin, Zamość, Toruń and Gdańsk. The domestic birds were examined during the four seasons of the year while the wild duck almost only in summer and early in autumn.

III. Methods

In my work I used the generally known methods of collecting, fixing and staining the helmintological material. My remarks on the methods are the following:

1. The time which theoretically may elapse from the death of the host to the moment when the section ought to be made and the material washed and fixed is generally stated to be anything from a few to twenty-four or even more hours. Yet in a number of cases this interval is too long. E. g., the scolex of *Sobolevicanthus gracilis*, one of the most common tapeworms of domestic duck becomes detached and the probably dissolves in the intestine already in 60 minutes after the death of the host. Consequently I was able to obtain a sufficient number of scolices of this species only when I started the section in under twenty minutes from the death of the duck. The ability of the scolex of *Sobolevicanthus gracilis, Drepanidotaenia przewalskii* and others to become detached and even that of the strobila to disintegrate into a number of loose fragments (*Sphenacanthus fasciculata*) under a short decomposing action of the intestine environment after the death of the host are both features of definite species which precisely for that reason require particularly careful quick technique of collecting.

2. The technique of measuring the rostellar hooks is methodically an important problem. A detailed examination of the variability of the dimensions and shape of the rostellar hooks of a size from a few microns onwards is possible only when a suitable micromanipulator is used with the help of which a hook may be laid parallel to the slide glass and observed. The direct preparation of hooks calls for much dexterity and spells hard work. That is why hooks are usually measured in their natural position on the rostellum and this leads to inaccurate measurements and a false picture of their structure being obtained. The examination of the hooks in cysticercoids is far easier and more convenient.

3. The fixing, staining, clearing and preserving of the tapeworms in Canada Balsam cannot fail to leave some effect on the picture of anatomical details, in some soft formations in particular. Elongated eggs with frail shells suffer most from this since they get considerably deformed. An accurate examination of such eggs may be made only in the material in fresh and in water.

4. The widely used methods of staining tapeworms with alumen and boracic carmine have lately been supplemented by the Blachin method of applying lactic acid carmine. This method has come to be used first of all to dye tapeworms having a thick layer of muscles which become overcleared. Its main advantage is that it sets off the ducts as well as the genital glands, sometimes very difficult to

examine. Its disadvantage consists in clearing too strongly muscular elements of the genital ducts such as sphincters, muscles of the copulatory part of the vagina etc., and in the corrosive action of lactic acid on small forms. Small-sized tapeworms, stained after the classical prescription of Blachin's when fresh after washing become frail and extensile, break easily and adhere to the glass of the vessel or even to the preparation needle so strongly that it is very difficult to remove them unhurt for further washing and preservation. Consequently I modified Blachin's prescription somewhat and preserved small tapeworms for a short time (the span of which it is difficult accurately to determine) in alcohol, bathed them in water again and only then applied lactic acid carmine. When acting for a short time alcohol seems to denature the albumen of the surface layer of the dermo-muscular body-wall which again hampers corrosion by lactic acid and prevents the adhesion of the preparation to the vessels. Experiments on the material preserved in alcohol, Boin's or Zenker's liquid for a long time were less successful. The staining of live material is not recommendable either.

5. At all events the preservation of the material should take place after the death of the parasites. Consequently the tapeworms ought to be removed from the intestine and cleansed in water till the movements of the dermo-muscular body-wall stop. In warm or lukewarm water the plateworms perish with their muscules relaxed and they may conveniently be stained with the Blachin method then or fixed and stained with other methods. The parasites should not be kept in water too long for fear of decomposition, which even in early stages makes the strobilae too extensile or break into loose fragments. When too much extended the strobila shows an artificial change in the position of the internal organs. The preservation of living material results again in an excessive contraction of the proglottids and this in turn not only involves a change in the shape of the strobila but also often makes it impossible to examine the structure of the internal organs which are then covered by a thickened layer of contracted muscles. The fixation was done most often in 75° solution of alcohol, less frequently in Zenker's or Boin's liquid.

6. The computation technique of the intensity of invasion of some tapeworm species in duck. The material from duck invaded by comparatively few tapeworms (up to a few hundreds) was collected and preserved and then the preparations mounted and examined

whole. On the other hand it would be technically too difficult to collect whole more numerous tapeworms (in one case over 10,000 specimens in one duck were found at Drużno Lake). In such cases all of the specimens found were counted and only a part, usually amounting to 30 to 50% of the total, were selected. On the basis of the quantitative specific composition of the parasitocenosis determined from the specimens preserved the corresponding figure for the total of the parasite specimens found in a given single host was calculated. Thus only assumed approximate figures quantitatively expressing the occurrence of various species of parasites in the host examined were arrived at. If e. g., 2,000 tapeworms were found during a section, 1,000 were prepared and marked. The results obtained were multiplied twice in order to arrive at the approximate number of a given tapeworm species in the host sectioned.

7. The species of the Drużno Lake ducks were determined by the ornithologists mgr Adam Krzanowski and mgr Jan Pinowski. The other ducks were identified by the present author after a key by Domaniewski (1951). It was very difficult to check the names of the ducks which had been registered as hosts of the parasites examined because of the long list of synonyms of various *Anseriformes*, particularly others than European. Eventually I accepted specific names of European *Anseriformes* after Domaniewski (Ornitologia Łowiecka, Vol. I., P.Z.W.S., Warsaw, 1951), those for American ones after Hellmayr (Catalogue of Birds of the Americas and the Adjacent Islands in Field Museum of Natural History, Chicago, 1948). For the other duck species I used names as given in special works on *Hymenolepididae*. The synonymy of the Russian names I needed to indentify the species of the hosts discussed in the Soviet works where no Latin names were given in the text was taken from a work by Ptushenko (Ptitsy Sovetskogo Soyuza, Vol. IV, Otriad guseobraznye, pp. 247—635, 1952, Gos. Izdat. „Sovetskaya Nauka", Moscow). This work was also indispensible for me to state which of the tapeworms I found were recorded in a given host for the first time and which had been known as parasites of a given bird species.

IV. General Comment

A. The list of hitherto known *Hymenolepididae* in the *Anseriformes* examined and invaded by tapeworms is presented in Table I.

B. As to the invasion of domestic and wild *Anseriformes* by tapeworms it should be stressed that the domestic duck were examined in the four seasons of the year, while the wild duck chiefly in summer and early in autumn, when the tapeworm invasion reaches its peak and the number of invaded birds is highest. The correction to be made because of the seasonal character of the occurrence of *Hymenolepididae* in ducks would actually influence only the figure representing the number of birds free from the parasites in question. Table II shows the number of the birds examined of respective species, the percentage of hosts free from invasion, the extensity and intensity of invasion with a given tapeworm species and the number of tapeworms found in a given host. In *Anas platyrhynchos* (L.) I found only 7.7 % specimens free from tapeworms, while in *Anas platyrhynchos dom.* (L.) as much as 49 %. The number of domestic duck free from tapeworms would be smaller if the figures for winter were left out of account when in contradistinction to domestic duck wild duck were not examined at all. On the whole I stated a smaller variety of tapeworm species (11) and a smaller intensity of invasion in domestic than in wild duck (16 species). Out of the ten tapeworm species occurring in domestic and wild duck I found only three in single sporadic cases in a greater number in one host in domestic than wild ducks. These findings do not however agree with the extensity of invasion which is too closely related with the seasonal character of the occurrence of the tapeworms. It is difficult to draw a conclusion on the evidence of the material examined as to what tapeworm species attack mainly domestic and wild birds respectively because the birds came from various biotopes. There seem to be no major differences in the specificity of tapeworms in relation to *Anas platyrhynchos* (L.) and *Anas platyrhynchos dom.* (L.). This problem ought to be gone into from this point of view especially with respect to a more abundant material yet coming from the same biotope. To what degree do wild duck constitute a „living collection" of the tapeworms I found in domestic duck? Aware of the whole imperfection of the observations of this kind, due to too small a number of the hosts examined I can say that out of the eleven tapeworm species I found in domestic duck only one was not found in any wild duck species, while all the others occurred in a number of other hosts at the same time. Thus outside domestic duck four tapeworm species were found in two species of wild hosts, two tapeworm species in three wild hosts, two in four wild

Specific composition of hitherto known *Hymenolepididae*

No	Tapewomors	Hosts											
		Anas platyrhynchos (L.)			*Anas platyrhynchos d.* (L.)			*Anser anser dom.* (L.)			*Chaulelasmus streperus* (L.)		
		a	b	c	a	b	c	a	b	c	a	b	c
1	*Apl. elisae* Skrj., 1914												
2	*Apl. fuligulosa* Solowiow, 1911												
3	*Apl. furcigera* (Rudolphi, 1819)	X		V	X		V	X	X	V	X		
4	*Apl. japonensis* Yamaguti, 1935	X											
5	*Apl. stefańskii* Czapliński, 1955				X		V						
6	*Diorchis (D.) flavescens* (Krefft, 1871)												
7	*Diorchis (D.) formosensis* Sugimoto, 1934				X								
8	*Diorchis (D.) inflata* (Rud., 1819)												
9	*Diorchis (D.) longiovum* Schiller, 1953												
10	*Diorchis (D.) mathevossianae* Krot., 1949												
11	*Diorchis (D.) nyrocae* Yamaguti, 1935	X		V									
12	*Diorchis (D.) parvogenitalis* Skrj. et Math., 1945	X											
13	*Diorchis (D.) ransomi* Schultz, 1940												
14	*Diorchis (D.) stefańskii* sp. n.	X	X	V	X	X	V	X	X	V	X	X	V
15	*Diorchis (D.) tshanensis* Krotow, 1949										X		
16	*Diorchis (D.) vigisi* Krotow, 1949												
17	*Diorchis (N.) acuminata* (Clerc, 1902)										X		
18	*Diorchis (N.) bulbodes* Mayhew, 1929	X											
19	*Diorchis (N.?) danutae* sp. n.												
20	*Diorchis (N.) longicirrosa* Meggitt, 1933												
21	*Diorchis (N.) spinata* Mayhew, 1929										X		V
22	*Dicranotaenia coronula* (Dujar., 1845)	X		V	X		V	X	X	V			
23	*Drepanidotaenia bilateralis* (Linst., 1905)												
24	*Drepanidotaenia lanceolata* (Bloch, 1782)				X			X		V			
25	*Drepanidotaenia przewalskii* (Skrj., 1914)							X	X	V			
26	*Drepanidotaenia spinulosa* Dubin., 1953												
27	*Echinocotyle clerci* Math, et Krot., 1949												
28	*Echinocotyle rosseteri* Blanchard, 1891				X								
29	*Echinocotyle skrjabini* Math. et Krot., 1949										X		
30	*Hym. abortiva* (Linstow, 1904)	X		V									
31	*Hym. aequabilis* (Rud., 1810)	X											
32	*Hym. anatina* (Krabbe, 1869)	X		V	X						X		
33	*Hym. andrejewoi* (Skrj. et Math., 1945)												
34	*Hym.* (s. l.) *angularostris* Sugim., 1934				X								
35	*Hym. arcuata* Kowalewski, 1904												
36	*Hym. compressa* (Linton, 1892)	X		V	X	X	V				X		
37	*Hym. echinocotyle* Fuhr., 1907	X											
38	*Hym.* (s. l.) *fallax* (Krabbe, 1869)												
39	*Hym. fausti* (Tseng Shen, 1932)	X											

Table I

in the *Anseriformes* examined.

Hosts													
Fuligula fuligula (L.)			*Nettion crecca* (L.)			*Nyroca ferina* (L.)			*Nyroca rufa* (L.)			*Querquedula querquedula* (L.)			Geographical distribution of tapeworms
a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	
						X			X	X	V				North Kazakhstan, Poland
X															Poland
			X		V	X									Europe, America, the Soviet Union
															Japan, North America
															Poland
			X												Australia, China, North America
															Formosa
						X			X	X	V				Europe, Africa, America, Asia
			X												North America
						X									West Syberia
X		V	X			X		V	X	X	V	X		V	Asia, (Japan, Syberia), Europe, (Poland)
X			X			X		V				X			Azerbaidjan, Syberia, Poland
						X			X	X	V				North America, the Ural, Poland
									X	X	V				Poland
															West Syberia
			X												West Syberia
			X			X									Ural
															North America, Yakutia, Azerbaidjan
									X	X	V				Poland (Drużno Lake)
			X												Egypt
															North America, Poland
X		V	X			X		V	X	X	V	X	X	V	Eurasia, America, Africa, Nepal
						X									West Taimyr
X						X			X						Eurasia, Austrialia, N. America
															Poland, Kazakhstan, Syberia
						X									West Syberia, (Tshani Lake)
			X									X			West Syberia, (Tshani Lake)
												X	X	V	England, Belgian Congo, Germany, Poland
			X												West Syberia
X															Germany, England, Poland, Egypt
															Europe, the Ural, Syberia
X						X									Eurasia, Africa, America
			X												Asia
															Formosa
X		V				X			X	X	V				Poland, Switzerland
X		V				X			X		V				America, Eurasia
															Germany, China, India
X						X						X			Europe
			X												China, Syberia

No	Tapewomors	Hosts								
		Anas platyrhynchos (L.)			*Anas platyrhynchos d.*(L.)			*Anser anser dom.* (L.)			*Chaulelasmus streperus* (L.)		
		a	b	c	a	b	c	a	b	c	a	b	c
40	*Hym. formosa* Dubinina, 1953												
41	*Hym. giranensis* Sugimoto, 1934				X								
42	*Hym. jamunica* Sharma, 1943	X											
43	*Hym. jägerskiöldi* Fuhrmann, 1913	X											
44	*Hym. kowalewskii* Baczyńska, 1914												
45	*Hym. nyrocae* Yamaguti, 1935	X											
46	*Hym. paracompressa* sp. n.	X	X	V	X	X	V	X	X	V			
47	*Hym. paramicrosoma* Gąsowska, 1931	X		V	X	X	V						
48	*Hym. parvula* Kowalewski, 1904	X		V	X		V						
49	*Hym. sacciperium* Mayhew, 1925	X											
50	*Hym.* (s. l.) *sagitta* (Rosseter, 1906)				X								
51	*Hym. setigera* (Fröhlich, 1789)	X			X			X		V			
52	*Hym. simplex* Fuhrmann, 1906												
53	*Hym. solowiowi* Skrjabin, 1914												
54	*Hym. spiralibursata* sp. n.	X	X	V									
55	*Hym. tenuirostris* (Rud., 1819)	X			X			X					
56	*Hym. teresoides* Fuhrmann, 1906	X									X		V
57	*Hym. trichorhynchus* Yoshida, 1910												
58	*Hym. trifolium* Linstow, 1905	X											
59	*Hym. tritesticulata* Fuhrmann, 1907	X											
60	*Hym.* sp. Cohn, 1901	X											
61	*Hym.* sp. Skrjabin, 1914												
62	*Hym.* sp. I Skrjabin, 1914												
63	*Hym.* sp. II Skrjabin, 1914												
64	*Orlovilepis infrequens* (Sharma, 1943)	X											
65	*Orlovilepis megalops* (Creplin, 1829)	X		V	X		V				X		
66	*Sobolevicanthus bisaccata* (Fuhr., 1906)										X		V
67	*Sobolevicanthus bisacculata* (Krot., 1949)				X								
68	*Sobolevicanthus fragilis* (Krabbe, 1869)												
69	*Sobolevicanthus gracilis* (Zeder, 1803)	X		V	X		V	X		V	X		
70	*Sobolevicanthus krabbeella* (Hughes, 1940)	X	X	V							X		
71	*Sobolevicanthus octacantha* (Krabbe, 1869)	X									X		
72	*Sobolevicanthus wiśniewskii* sp. n.												
73	*Sphenacanthus fasciculata* (Ransom, 1909)							X		V			
74	*Sphenacanthus fimula* (Meggitt, 1933)												
75	*Sphenacanthus macracanthos* (Linstow, 1877)												
76	*Sphenacanthus macrocephala* (Fuhr., 1913)	X		V									

Hosts																		Geographical distribution of tapeworms
Fuligula fuligula (L.)			*Nettion crecca* (L.)			*Nyroca ferina* (L.)			*Nyroca rufa* (L.)			*Querquedula querquedula* (L.)						
a	b	c	a	b	c	a	b	c	a	b	c	a	b	c				
X						X												Syberia
																		Formosa
																		Nepal
																		Africa
X																		Germany, Egypt
												X						Japan, Moscow (Zoo)
						X	X	V	X	X	V	X	X	V				Poland
X						X			X	X	V							Europe
									X	X	V							Europe (Czechoslovakia), Moscow (Zoo), Ukraine, Germany, Poland
																		North America (Illinois)
																		Europe
X						X												Europe, India, Asia
			X															China
						X			X									China, South Kazakhstan
						X	X	V	X	X	V	X	X	V				Poland
X												X						Europe, Syberia
			X						X	X	V							Poland, Czechoslovakia, the Soviet Union, Australia?, Syberia, North America
			X															Japan
																		Germany
																		China
																		Poland
						X												South Kazakhstan
						X												South Kazakhstan
						X												South Kazakhstan
																		Nepal
X			X			X			X		V	X						the Americas, Europe, Japan, Syberia, Egypt
			X						X									Brazil, Azerbaidjan, Poland
						X												West Syberia
			X			X												Denmark, West Syberia
			X		V	X			X	X	V	X		V				Eurasia, Africa
			X		V	X						X	X	V				Poland, Eurasia
			X			X			X			X		V				Europe, (Poland), Africa, Syberia
						X	X	V	X	X	V							Poland, (Drużno Lake)
			X			X												Europe, Japan, China, India
						X												India
						X												Germany, Switzerland, Azerbaidjan, Yakutia
						X	X	V	X	X	V							Norway, Poland, the Soviet Union

No	Tapewomors	Hosts											
		Anas platyrhynchos (L.)			*Anas platyrhynchos d.* (L.)			*Anser anser dom.* (L.)			*Chaulelasmus streperus* (L.)		
		a	b	c	a	b	c	a	b	c	a	b	c
77	*Sphenacanthus oshimai* (Sugimoto, 1934)				X								
78	*Sphenacanthus rangoonica* (Sharma, 1943)	X											
79	*Sphenacanthus sharmi* (Skrj. et Math., 1945)	X											
80	*Sphenacanthus skrjabini* (Skrj. et Math., 1945)												
81	*Sphenacanthus venusta* (Rosseter, 1897)	X			X								
82	*Fimbriaria fasciolaris* (Pall., 1781)	X		V	X		V	X		V	X		
83	*Diploposthe laevis* (Bloch, 1782)	X			X			X	X	V	X		
84	*Diploposthe skrjabini* Math., 1942												
85	*Diploposthe* sp. Math., 1942												
86	*Apora dogieli* Ginezinskaja, 1944	X									X		
	Total of species	40	4	16	24	4	11	12	6	11	17	1	4

hosts, one in five wild hosts and one in six. It follows from this that wild duck is very likely to spread the tapeworm of domestic duck, while with domestic geese, in which I found eleven tapeworm species as well this is not the case. First of all no one of the four tapeworm species most frequently encountered by me (*Drep. lanceolata*, *Drep. przewalskii*, *Hymenolepis setigera* and *Sphenacanthus fasciculata*) contained in my material was found in any other wild duck species. The other seven species whose occurrence in geese is, as I found it, of a sporadic character, I found in other species of hosts as well. Thus I found two tapeworm species in two species of wild hosts, one in three hosts, two in four, one in five and one in six species of hosts. Six tapeworm species were found to be common for domestic duck and geese (see Table II). Since the occurrence in domestic goose of tapeworms common to itself and wild duck has been seldom stated it can be assumed that wild duck is not very likely to spread the tapeworms of domestic goose. It was impossible for me to compare the state of tapeworm invasion of domestic and wild geese because I had no material from wild geese at my disposal.

The high percentage of domestic geese free from tapeworms

Hosts																		Geographical distribution of tapeworms
Fuligula fuligula (L.)			*Nettion crecca* (L.)			*Nyroca ferina* (L.)			*Nyroca rufa* (L.)			*Querquedula querquedula* (L.)						
a	b	c	a	b	c	a	b	c	a	b	c	a	b	c				
																		Formosa
																		Nepal
																		Nepal
						X												West Syberia (Tshelyabinsk)
																		England
X		V	X		V	X		V	X	X	V	X		V				Eurasia, Australia, America, Africa
X			X			X		V	X		V	X						Eurasia, Australia, North America, Africa
									X									Azerbaidjan
									X									Azerbaidjan
						X												Europe (the Volga Delta)
18		5	22		4	40	4	9	26	17	20	16	5	9				

Explanations:
V — species known in the given host but not found by the author
XV — species known in the given host found by the author
XXV — new species or one discovered in the given host for the first time

may be accounted for by the seasonal character of the occurrence of the tapeworms: out of 95 birds 75 were free from tapeworms in winter (76.8 %), out of 20 birds ten (50 %) were not invaded in spring, out of 72 birds examined only 26 (36.1 %) did not show the presence of the tapeworms in question in summer, while out of the 43 specimens examined I found 23 (53.4 %) to be free from tapeworms in autumn.

V. Systematization

A. The present author followed the arrangement types of the structure of the rostellar hooks and of the location of the genital glands as presented by Skrjabin & Mathevossian (1945). This arrangement has been widely used in works by Soviet helmitologists since it is a great help in the presentation of a short diagnosis of the species. In Part VII alongside of the conventional name of the type of the structure of the rostellar hooks and the numerical symbols of the location of the genital glands I have given also a brief

Table II

List of tapeworm species found in 9 species of *Anseriformes* with extensity and intensity of vermination

No	Host		*Anas platyrhynchos* (L.)	*Anas platyrh. dom.* (L.)	*Anser anser dom* (L.)	*Chaulelasmus streperus* (L.)	*Fuligula fuligula* (L.)	*Nettion crecca* (L.)	*Nyroca ferina* (L.)	*Nyroca rufa* (L.)	*Querquedula querquedula* (L.)	*Total of tapeworm specimens*
	Number of specimens of hosts	examined	77	100	230	7	1	7	6	23	14	
		free form tapeworms	6	49	132	2		2			5	
	Tapeworm species											
1	*Aploparaksis elisae* Skrj., 1914	Extensity								1		
		Intensity								3		3
2	*Aploparaksis furcigera* Rud,. 1819)	Extensity	15	9	1			1				
		Intensity	1—25	1—70	1			2				222
3	*Aploparaksis stefańskii* Czap., 1955	Extensity		1								
		Intensity		18								18
4	*Diorchis (D.) inflata* (Rud., 1819)	Extensity								2		
		Intensity								2 176		178
5	*Diorchis (D.) nyrocae* Yam., 1935	Extensity	10				1		3	8	3	
		Intensity	2—50				14		6—38	2—178	15 32	536
6	*Diorchis (D.) parvogenitalis* Skrj. et Math., 1945	Extensity							1			
		Intensity							7			7
7	*Diorchis (D.) ransomi* Schultz, 1940	Extensity								2		
		Intensity								1—141		142
8	*Diorchis (D.) stefańskii* sp.n.	Extensity	31	15	1	1				1		
		Intensity	1—291	1—60	1	1				1		696
9	*Diorchis (N.?) danutae* sp.n.	Extensity								4		
		Intensity								1—7		10

10	*Diorchis (N.?) spinata* Mayh., 1929	Extensity Intensity				1 9						9
11	*Dicranotaenia coronula* (Duj., 1845)	Extensity Intensity	23 1—71	14 1—183	4 1—25		1 12		1 4	6 1—300	1 11	1528
12	*Drepanidotaenia lanceolata* (Bloch, 1782)	Extensity Intensity			79 1—28							457
13	*Drepanidotaenia przewalskii* Skrj., 1914	Extensity Intensity			35 1—159							439
14	*Echinocotyle rosseteri* Blanch., 1891	Extensity Intensity									2 31—298	846
15	*Hymenolepis abortiva* (Linst., 1904)	Extensity Intensity	6 6—13									51
16	*Hymenolepis anatina* (Kr., 1869)	Extensity Intensity	3 1—125									127
17	*Hymenolepis arcuata* Kow., 1904	Extensity Intensity					1 435			2 1—380		816
18	*Hymenolepis compressa* (Linst., 1892)	Extensity Intensity	2 1—36	1 2			1 425			2 1—371		856
19	*Hymenolepis paracompressa* sp.n.	Extensity Intensity	38 1—7288	13 2—224	1 4				1 4	6 3—380	1 62	17213
20	*Hymenolepis paramicrosoma* Gąs., 1931	Extensity Intensity	27 1—559	1 28						1 97		2088
21	*Hymenolepis parvula* Kow., 1904	Extensity Intensity	6 1—5	6 2—32						1 6		86
22	*Hymenolepis setigera* (Fröl., 1789)	Extensity Intensity			18 1—249							411
23	*Hymenolepis spiralibursata* sp.n.	Extensity Intensity	27 1—2539						4 1—79	17 7—1838	1 2	10286
24	*Hymenolepis teresoides* Fuhr., 1906	Extensity Intensity				4 1—10				1 1		15

No	Host		*Anas platyrhynchos* (L.)	*Anas platyrh. dom.* (L.)	*Anser anser dom.* (L.)	*Chaulelasmus streperus* (L.)	*Fuligula fuligula* (L.)	*Nettion crecca* (L.)	*Nyroca ferina* (L.)	*Nyroca rufa* (L.)	*Querquedula querquedula* (L.)	Total of tapeworm specimens
25	*Orlovilepis megalops* (Crep., 1829)	Extensity	3	2						3		
		Intensity	2—4	2—6						2 7		29
26	*Sobolevicanthus bisaccata* (Fuhr., 1906)	Extensity				1						
		Intensity				2						2
27	*Sobolevicanthus gracilis* (Zed., 1803)	Extensity	16	31	2			1		1	2	
		Intensity	1—120	1—121	2—6			12		3	22—43	1200
28	*Sobolevicanthus krabbeella* (Hughes, 1940)	Extensity	2					5			4	
		Intensity	1					1—21			1—3	53
29	*Sobolevicanthus octacantha* (Kr., 1869)	Extensity									2	
		Intensity									7—15	22
30	*Sobolevicanthus wiśniewskii* sp.n.	Extensity							1	3		
		Intensity							39	1—42		110
31	*Sphenacanthus fasciculata* (Ran., 1909)	Extensity			13							
		Intensity			1—61							127
32	*Sphenacanthus macrocephala* (Fuhr., 1913)	Extensity	14						1	1		
		Intensity	2—47						4	16		157
33	*Fimbriaria fasciolaris* (Pall., 1781)	Extensity	36	20	1		1	1	3	16	1	
		Intensity	1—40	1—64	2		2	3	4—44	1—101	22	969
34	*Diploposthe laevis* (Bloch, 1782)	Extensity			1				3	13		
		Intensity			2				5-299	1—840		1483
	Number of species		16	11	11	4	5	4	9	20	9	
	Number of tapeworms		25,093	2,494	1,492	26	888	60	588	9,423	1,108	41,172

descriptive characterization of these types in order to obtain a greater accuracy of description. Yet in a schematic treatment of the characterization of a genus or a species the acceptance of numerical and verbal symbols constitutes a great simplification. Below I give drawings of thirteen types of the structure of the rostellar hooks and fourteen types of the location of the genital glands with explanations after Skrjabin & Mathevossian (1945) (Fig. 1—2).

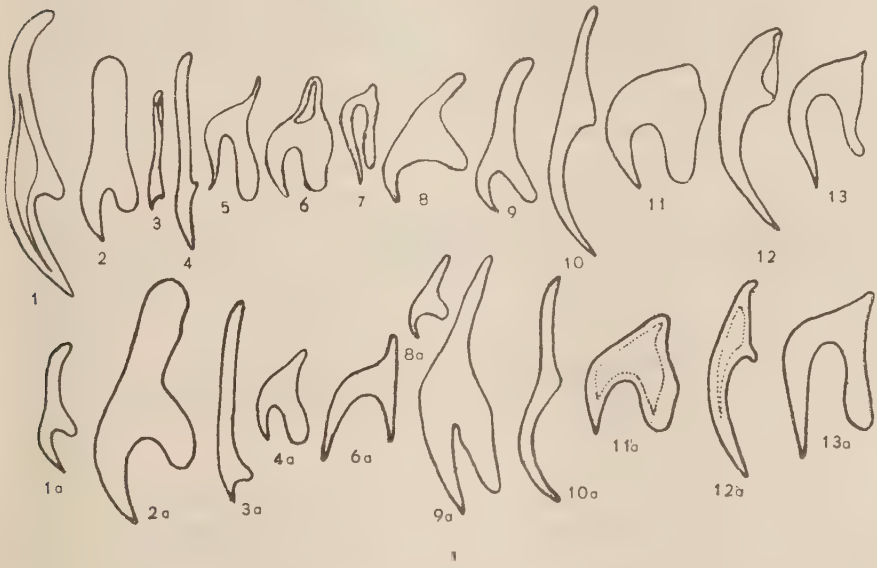

Fig. 1. Types of structure of rostellar hooks after Skrjabin and Mathevossian (1945).
I used the 'us' ending in order to use the name of the type of the hook in Latin, e.g., 'typus skrjabinus'.

1 — 'diorchis' (*Diorchis D. americana*); 1a — (*Fimbriaria fasciolaris*); 2 — 'polygrammus' (*Hymenolepis polygramma*); 2a — (*Hym. multistriata*); 3 — 'arcuatus' (*Hym. arcuata*); 3a — (*Diploposthe laevis*); 4 'cambrensis' (*Hym. cambrensis*); 5 — 'cricetus' (*Dicranotaenia criceti*); 5a — (*Dicr. microstoma*); 6 — 'coronulus' (*Dicranotaenia coronula*); 6a — *Hym. petrodromi*); 7 — 'polyacanthus' (*Dicranotaenia polyacantha*); 8 — 'pseudhymenolepis' (*Pseudhymenolepis redonica*); 8a — (*Hym.* (s. l.). *solitaria*); 9 — 'fraternus' (*Hym. fraterna*); 9a — (*Dicranotaenia spinulosa*); 10 — nitidus (*Echinocotyle nitida*); 10a — (*Hym. laurieri*); 11 — 'musculosa' (*Hym. musculosa*); 11a — (*Hym. aequabilis*); 12 — 'skrjabini' (*Hym skrjabini*); 12a — (*Hym. macracanthos*); 13 — 'aploparaksis' (*Aploparaksis skrjabini*); 13a — (*Oligorchis kwangensis*).

B. The systematization of *Hymenolepididae* is largely based on the topography of the genital glands. So far almost all Western writers have still classified *Hymenolepididae* with three testes in a proglottid to the genus *Hymenolepis* Weinland, 1858. In the last few decades various attempts have been made to split this enormous

group into various species and higher systematic units and they are presented in a monograph by Skrjabin & Mathevossian (1945). The diagnosis of a number of species: *Drepanidotaenia* Railliet, 1892, *Dicranotaenia* Railliet, 1892, *Weinlandia* Mayhew, 1925, *Wardium* Mayhew, 1925, *Fuhrmanniella* Tseng Shen, 1932, was based on the differences in the location of the

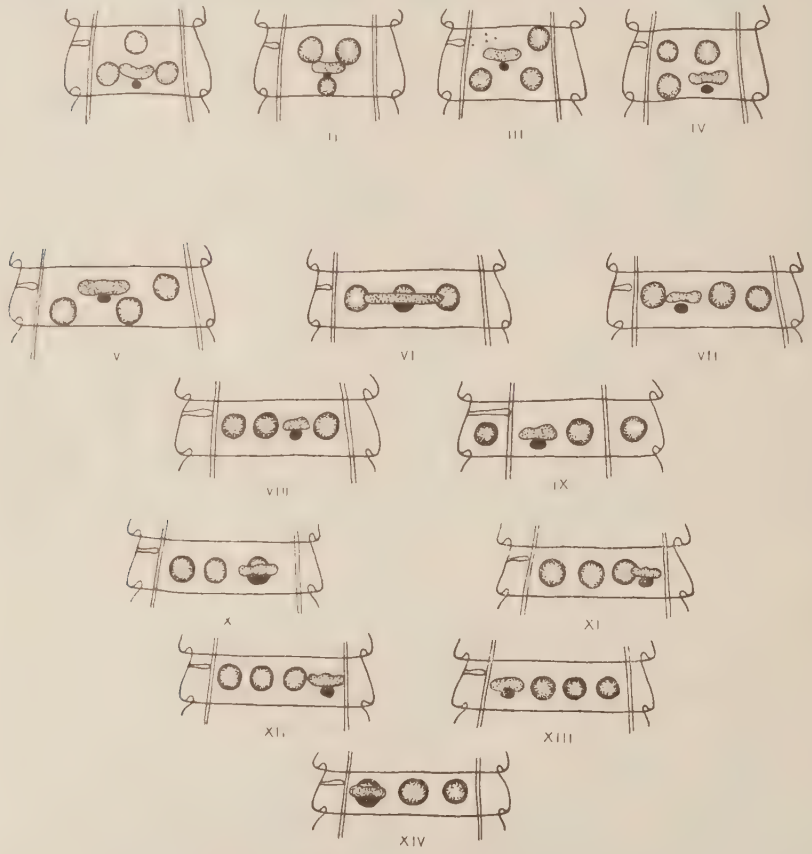

Fig. 2. Types of location of genital glands after Skrjabin & Mathevossian (1945).

testes with respect to the female genital glands. Such systematic criteria are far from perfect, for the location of the testes sometimes varies so much that the identification of the genus meets with serious difficulties. Yet despite these oscillations in most avian *Hymenolepididae* a basic type characteristic of a given species of

the location of the genital glands may still be determined. In my opinion it is not possible to create systematic units on the basis of a single feature like the location of the genital glands or the structure of the rostellar hooks. Spassky & Spasskaja (1954) are the authors of a systematic conception concerning tritesticular *Hymenolepididae* of birds. Sound on the whole, this conception is based on a complex of features, not only anatomical, among which such a property as the location of the genital glands is of minor importance, but also ecological, as the specificity with respect to definite intermediate and definitive hosts. Since there are no exact figures concerning both the anatomy and the life cycles of many of *Hymenolepididae* only a small number of the tapeworms hitherto known of this group may be assigned to the systematic arrangement of Spassky and Spasskaja. The authors themselves could find no room for over a half of the recorded species within the 25 genera accepted by them. They mention only 159 species of *Hymenolepididae*, while up to the time when they published their work over 320 tritesticular avian tapeworms of this group had been known among the representatives of the subfamily *Hymenolepidinae*. The question crops up how are the scores of other tapeworms species (about 165 in number) to be classified of which we generally know too little to be able to assign them to new species. This proves the need for the recognition for the time being of a systematic arrangement which would be adequate to the present state of our *Hymenolepididae*. The acceptance of a working generic diagnosis of *Hymenolepis* Weinland, 1858 s.l. for most of the hitherto known tritesticular avian tapeworms of the group discussed seems to be most recommendable. At the same time it seems legitimate to exclude from the genus *Hymenolepis* Weinland, 1858 s.l. the following genera: *Dicranotaenia* Railliet, 1892 sensu Spassky et Spasskaja, 1954, *Drepanidotaenia* Railliet, 1892, sensu Spassky et Spasskaja, 1954, *Echinocotyle* Blanchard, 1891, *Orlovilepis* Spassky et Spasskaja, 1954, *Sobolevicanthus* Spassky et Spasskaja, 1954 and *Sphenacanthus* Lopez-Neyra, 1942 sensu Spassky et Spasskaja, 1954. The species belonging to the above mentioned genera may be distinguished from others quite easily. The creation of the other genera for the species parasitic in *Anseriformes* and other water birds does not seem sufficiently well-grounded. I suggest that *Bisaccanthes bisaccata* (Fuhrmann, 1906) the only representative of

the genus *Bisaccanthes* Spassky et Spasskaja, 1954 should be included to the genus *Sobolevicanthus* Spassky et Spasskaja, 1954. The species *Sobolevicanthus krabbeella* (Hughes, 1940) I assign to the genus *Sobolevicanthus* as well. In my opinion there are no reasons either for creating a separate genus for *Tschertkovilepis setigera* (Frölich, 1789) the only representative of the genus *Tschertkovilepis* Spassky et Spasskaja, and consequently I assign this species to the genus *Hymenolepis* Weinl., 1858 s.l. I propose to make a more detailed analysis of the system of Spassky and Spasskaya (1954) separately.

VI. On Variability

In the anatomical examination of tapeworms I distinguish three principle categories of features: 1. permanent features, 2. plastic features, and 3. physiologically variable features, although a strict division of them is sometimes difficult.

1. I rank among the permanent features: formations of durable chitinous structure, a — shape, size and number of rostellar hooks, b — armature of suckers, c — armature and size of cirrus, d — shape and structure of eggs and embryonic hooks, e — structure and sensu lato topography of the internal organs (genital, muscular, excretory and nervous systems), f — the basic character of the structure of the proglottids.

a. Shape, size and number of rostellar hooks. The shape of the hooks is a most stationary feature. Because of the usually small dimensions of the hooks, the difficulties in procuring them and the necessity to base the observations upon a scanty material, the possibility of overlooking some details of their structure, divergent views are very frequent in the literature. Almost every writer views the hooks, particularly those of some what more complicated structure, in a peculiar, different way. I hardly noticed any differences in the structure of the rostellar hooks within the same species in my material.

The figures of Tseng Shen (1932), concerning the length of the *Diorchis* (*D.*) *flavescens* (Krefft, 1871) rostellar hooks, which is reported to vary from 36 tu 66 μ calls for confirmation. The figures of Krabbe (1869) concerning the length of the *Hym. microsoma* (Creplin, 1829) hooks, which is said to amount to 35 to 61 μ, have not been recognized. When stating such a great difference of the

length Krabbe (1869) must have failed to distinguish as many as three species of which the distinction is indubitable: *Hym. microsoma, Hym. paramicrosoma* and *Hym. paracompressa* sp.n (a new species which will be described in the faunistic part). It follows from my examination that the oscillations of the dimensions of the rostellar hooks (I examined a few scores of a definite species), do not actually exceed 11 % of their maximum length. *Dicranotaenia coronula* (Dujardin, 1845) constitutes an exception here as in it I found oscillations of 15.0 to 20.0 μ, i.e. 25 %, while according to the literature these oscillations are still greater and amount to 11.0 to 17.6 μ, i.e., 37.4%. It should however be noted that the peculiar character of the *Dicranotaenia coronula* rostellar hooks (short and thick) leaves room for mistakes in measurements, which considering the small length of the hooks results in a comparatively high percentage of oscillation.

The number of rostellar hooks is a stationary feature, particularly in forms carrying eight to ten hooks. The varying number of hooks as stated in the diagnosis of the species *Dicranotaenia coronula,* from 20 to 26, is in my opinion an unreliable observation. Small numerous hooks easily get detached from the rostellum still when the parasite stays inside the body of the host. The muscles used to move the hook disappear after it is detached and consequently, I believe, it is difficult when some time has elapsed to decide whether the hooks has got detached or there has been no hook at all. The number of hooks may be determined with all certitude in cysticercoids of a given species.

b. The armature of the suckers with small spines or hooks is a feature which was used also in the characterization of the genus *Echinocotyle* Blanchard, 1891 and of the subgenus *Diorchis* Skrjabin et Mathevossian, 1945 (of the genus *Diorchis* Clerc, 1903). This subgenus was created as a contradistinction of the subgenus *Nudiorchis* Skrjabin et Mathevossian, 1945 whose representatives are characterized by unarmed suckers. It should be remembered that the spines and hooks easily get detached from mature specimes, often together with a cuticular layer to which they are attached. Consequently the lack of armature of the suckers can be stated for sure only in the cysticercoids of the species examined. Therefore finding no acetabular armature in mature specimens does not mean its real absence. This observation makes doubtful the taxonomical value of both subgenera. Still, as there are no

verified data on the existence, as it may be supposed, of tapeworms of the genus *Diorchis* C l e r c, 1903 with none but armed suckers, no proposition can be made of abolishing the subgenera *Diorchis* and *Nudiorchis*.

c. Armature, shape and dimensions of cirrus. The armature of the cirrus is, like the armature of the suckers, a permanent feature, one with no plasticity. Yet the small spines occurring e.g., in some representatives of the genus *Diorchis* (e.g., *D. ransomi*) easily wear off. That is why this feature was included to the specific diagnosis of *D. ransomi* only many years after this species were discovered (D u b i n i n a, 1953). The dimensions of the cirrus vary little. In forms with no characteristic terminal of the distal part of the cirrus and characterized by a delicate extensile structure of this organ, e.g., *Diorchis (D.) inflata* (R u d o l p h i, 1819) it is difficult to say when it is fully extended. The structure of the cirrus is decisive here.

d. The shape and structure of eggs and embryonic hooks rank among properties very characteristic of almost every species. The oscillation of the dimensions amounts to little over twenty per cent. An elongated spindle-like shape of eggs is characteristic also of many a species of the genus *Diorchis*. The spindle-shaped eggs in the genus *Aploparaksis*, viz., *Apl. stefańskii*, unknown before yet recorded by the present author, seem to witness to a philogenetic relation between both genera.

e. Structure and topography of internal organs. The structure of the genital system, e.g., a lobate, reticulated, finger-shaped ovary, a sacciform or reticulated uterus, a strongly or poorly muscled cirrus sac, the occurrence of a definite number of bundles of internal longitudinal muscles etc. all rank among distinctly permanent features characteristic in relation to other properties not only to species but also to higher systematic units. A great permanence is shown by the structure of the cirrus sac the size of which varies little. Apart from the physiological variability the extent of which depends on the contractility of the walls of the cirrus sac its absolute dimensions prove to be fairly constant and almost independent of the state of growth of the tapeworm of a definite species.

f. The basic character of the structure of the proglottids is constant apart from frequent artefacts due to errors committed during the preservation of the material and consisting in their excessive elongation or contraction which are most frequently occasioned by the preservation of live specimens.

2. Plastic features: a — length and width of strobila; b — number of proglottids in mature specimens; c — occurrence of internal organs in a difinite proglottid behind the scolex; d — size of uterus and sometimes of ovary; e — size and shape of testes; f — relation of length of cirrus sac to width of the proglottid.

a. The length and width of the strobila varies to a great extent. In an experimental invasion of dogs Pawlowski and Gnezdilow, 1949 (according to Spassky & Spasskaja, 1954, p. 106) obtained mature specimens of *Dyphyllobothrium latum* which reached only 5 cm in length, while specimens of this species of tapeworm have been recorded which reach over 20 m in length, i.e., are twenty times as long. I did not observe so great differences in the dimensions of the strobilae in *Hymenolepididae,* yet they are also considerable. Thus the dimensions of mature *Hymenolepis paracompressa* sp.n. specimes vary from 3.6 by 0.55 to 37.0 by 1.01 mm. I observed a great oscillation of the dimensions in other tapeworms as well, e.g., *Dicranotaenia coronula, Hymenolepis spiralibursata* sp.n., and, to a lower degree, in *Hymenolepis setigera* and *Drepanidotaenia lanceolata.* In this connection it is my opinion that the dimensions of the strobila are not an essential feature in the determination of species, yet to know the extent of the oscillation of the dimensions of the tapeworm is of great importance, when, e.g., the structure of the population is being examined. I think that the division, applied by Schultz (1940) in the key for determining the species of the genus *Diorchis,* of tapeworms into whole sets of species of which some have strobilae shorter than 50 mm, while others are longer than 50 mm, does not serve the purpose. The same species of tapeworms occurring in domestic and wild duck are almost invariably longer in the former. This is related to the different character of the environment of the first order, constituted here by domestic ducks, which differ from wild ones in their way of life and mode of feeding. Besides it shows the causal connection between the number of the population and the size of the specimens. Wild ducks are usually more intensively invaded than domestic ones. These differences are well ilustrated by the dimensions of *Dicranotaenia coronula, Hymenolepis paracompressa* sp.n., and *Hymenolepis spiralibursata* sp.n. in domestic and wild duck. In some species larger differences may be observed in the width of the proglottids (e.g. in *Diorchis* (*N.?*) *danutae* sp.n.), in others their number varies.

b. The number of proglottids in mature specimens strictly de-

pends on the state of growth of the tapeworms and varies to a great extent. Thus, mature *Hymenolepis paracompressa* sp.n. specimens have antythiing from fifty-odd to well over three hundred proglottids.

c. The occurrence of the internal organs in a difinite proglottid behind the scolex also depends on the state of growth of the tapeworm, just as the number of proglottids does.

d. The size of the uterus and sometimes that of the ovary must be regarded as one of the highly plastic features related to the state of growth of the proglottids. Thus, if a narrow form of *Diorchis danutae* sp.n. is compared with a wide one, it will be evident that the size of the ovary and of the uterus is proportional to the size of the proglottid, while the vitelline gland shows more constancy and the cirrus sac most. This is also the case with *Hymenolepis paracompressa* sp.n. and other tapeworms, e.g., *Drep. lanceolata* and *Hym. setigera.*

e. Size and shape of testes. The size of the testes varies to a great extent even in the same specimen and it is difficult to ascribe to this fact any character of an abnormal phenomenon. As observed by the present author these oscillations amount to 239 to 464 by 327 to 681 μ in *Drepanidotaenia lanceolata* (240 to 320 by 500 μ according to Skrjabin and Mathevossian, 1945), to 39 to 130 μ in diameter in *Hymenolepis paracompressa* sp.n. In other species the size of the testes varies greatly as well and consequently no great importance from the point of view of systematization may be ascribed to this feature. The shape of the testes also varies: deep incisions on the sufrace of the testes are often stated in *Sphenacanthus macrocephala* and *Drepanidotaenia lanceolata*, although usually their shape is round or oval and their contours regular and smooth; I observed the same, although not so distinct, phenomenon in *Hymenolepis paracompressa* sp.n. and others.

f. The relation of the length of the cirrus sac to the width of the proglottid. It should be noted that besides the natural physiological differences in the relation of the length of the cirrus sac to the width of the proglottid an important part is being played here by the state of growth and not only that of development of the given proglottid. In relation to various factors of the environment, among which the density of the population may already be fully emphasized now, tapeworms reaching full maturity are of various sizes. Thus, in the proglottids of small narrow forms of *Diorchis (N.?)*

danutae sp.n. the cirrus sac reaches half way trough the width of the proglottid, while in large wide forms it only distinctly crosses the poral excretory canals and does not reach the central line of the tapeworm body. In small forms of *Hymenolepis paracompressa* sp.n. the cirrus sac stretches over the whole width of the genital proglottid and reaches as far as the antiporal margin, while in large and wide forms of this species it only reaches well beyond the central line of the genital proglottid. In long yet narrow forms these relations resemble those in small ones.

It is not by chance that the features mentioned under Points d, e and f should close the list of plastic features. The anatomical examination of a large number of specimens of a definite species proves that these features cannot be asigne to the category of permanent features, yet the extent of their variability is not, on the whole, so wide as that of the length of the strobila, the number of proglottids and the appearance of the internal organs in a definite proglottid behind the scolex.

The division into permanent and plastic features is only a working division the aim of which is to point out to more or less variable properties.

To justify this division let me add that the measurable permanent features in my material usually amounted to a few to over twenty per cent of oscillation from the minimum dimensions, while the oscillation of the plastic features sometimes reached figures of a few hundred per cent.

3. Physiologically variable features: a — relation of length of cirrus sac to width of proglottid; b — size of cirrus sac; c — reticulated structure of ovary; d — shape of proglottids; e — location of bottom of rostellar pouch in relation to suckers; f — shape of testes; g — size and shape of seminal vesicles and seminal receptacle.

a. Relation of length of cirrus sac to width of proglottid. As they mature the proglottids become wider and wider to reach a maximum width when they fill up with a uterus containing young eggs. These are the so-called young uterine proglottids. The cirrus sac most often reaches the peak of development and growth in young genital proglottids, i.e., in the male proglottids containing well-developed testes and the anlage of the female genital glands. In these proglottids the cirrus sac, located usually across the pro-

glottid, reaches farthest in the antiporal direction, i.e., takes up most room in the proglottid in relation to its width. In the farther proglottids the cirrus sac keeps the same absolute size varying to a small extent characteristic of the species and, as the proglottids gradually widen, stretches over a relatively shorter and shorter distance in the antiporal direction. Thus the cirrus sac occupies in the young uterine proglottids the smallest part of their width and in the male genital ones the largest.

b. The size of the cirrus sac is one of the most constant features, yet we must take here into account physiological variability specific to some species. This phenomenon is also closely related to the degree of development and the contractility of the musculature of the cirrus sac and to the degree to which the internal seminal vesicle is filled with sperm. E.g., *Hymenolepis paracompressa* sp.n. has fairly well-developed elongated muscles of the cirrus sac, which sometimes contract so much that the cirrus sac of this species then closely resembles the *Hymenolepis paramicrosoma,* Gąsowska, 1931 cirrus sac. On the other hand the muscles of the *Hymenolepis paramicrosoma* cirrus sac are located in the thickest layer in the central part of the cirrus sac, they are short and thick, and consequently when contracting they cannot change the dimensions of the cirrus sac so much as the case is with *Hymenolepis paracompressa* sp.n.; nor can they stretch too much when they relax. This can be observed even more easily in the almost spherical, strong-muscled cirrus sac of *Hymenolepis compressa* (Linton, 1892) whose short and very thick muscles admit of only very slight distortions caused by contractions and relaxations. The conclusion may be drawn that the longer and stronger the muscles of the cirrus sac, the larger its distortions may be, which should be made allowances for when measurements are taken. Thus, very weak, thin muscles of *Aploparaksis stefańskii* Czapliński, 1955' or, on the contrary, very thick yet short muscles in say *Hymenolepis compressa* prevent the distortion of the cirrus sac. As a rule the structure and the size of the cirrus sac is a fairly constant feature, independent of the size of the strobila, and lies within the extent of oscillation characteristic of various species. An example here is provided by the *Hymenolepis paracompressa* sp.n. cirrus sac. In small forms of this species (about ten times as small as big ones) the cirrus sac is somewhat shorter than in large forms, yet somewhat thicker at the same time. This can be accounted

for by the fact that in a small tapeworm it cannot strech its full length in a proglottid slightly narrower than normal and is always a little contracted. It should be noted that it is only in the genital proglottids that the cirrus sac of this species stretches typically, over almost their whole width. In *Dicranotaenia coronula* (Dujardin, 1845) the cirrus sac is meagre-muscled and its size strictly depends on the degree to which the internal seminal vesicle is filled with semen. That is how we ought to explain the large oscillation of the length and width of the cirrus sac as stated by various authors: Skrjabin & Mathevossian (1945), 258 to 300 by 70 to 80 μ; Shepard (1943), 308 to 351 by 94 to 102 μ; myself, 303 to 597 by 90 to 166 μ. It follows from my observations that the *Dicranotaenia coronula* cirrus sac reaches the largest dimensions in the mature genital proglottids with well-developed and differentiated female genital glands, although its development is accomplished before. Let me add as an example that a fully developed cirrus sac of this species reaches in young genital proglottids dimensions varying from 180 to 400 by 66 to 74 μ, while in older genital proglottids with a well-deweloped vitelline gland and ovary these dimensions amount to 400 to 597 by 110 to 120 μ. It was my principle when measuring the cirrus sac to accept its maximum dimensions in a given specimen and that is why my figures are generally larger than those stated in the literature. It should be noted that the capacity of the cirrus sac does not vary so greatly as its length and thickness do, for a long cirrus sac is comparatively narrow, e.g., 579 by 110 μ, while a shorter one is thicker at the same time, e.g., 376 by 166 μ.

c. The reticulated structure of the ovary is systematically a very important feature, but it ought to be borne in mind that while it is conspicuous in the early stages of development of the ovary it becomes effaced in the further stages because of the growth of the processes anastomosing with each other. The ovary seems to be a formation of a compact structure then. This is illustrated by the structure of the ovary of *Hymenolepis paracompressa*, in which I observed the reticulated structure of this organ only after I applied the Blachin Method.

d. The shape of the proglottids is variable in some species. This applies to the variability of the antiporal part of the velum, which say in *Hymenolepis villosa* sometimes shows a very large elongation considered a symptom of its adaptation to environments poorer in

food (extension of osmotic surface). I observed this phenomenon in *Hymenolepis arcuata* Kowalewski, 1904.

e. The location of the bottom of the rostellar pouch with respect to the suckers is a feature which depends on the state of contraction of the muscles retracting the pouch and can be of no major taxonomical value. It is clear that the muscular system also depends on the state of contraction and that is why I do not think it rational to ascribe to this feature the importance of a property characteristic of the species. Presenting a description of *Weinlandia introversa*, Mayhew (1925, p. 68) regards the muscular system and the location of the rostellar pouch as one of the major features distinguishing this species from other similar ones and this was reflected in the Latin specific name given by this author. In my opinion *Weinlandia introversa* Mayhew, 1925 is a synonym of *Dicranotaenia coronula* (Dujardin, 1845).

f. The shape of the testes in say *Dicranotaenia coronula* varies as the degree of their maturity. Young testes are irregular in shape and have deep incisions on their sufrace, which make a young testis resemble a rosette. When reaching their full productive ability fully mature testes become round and assume a spherical or oval shape and their sufrace becomes quite smooth. Incisions on the sufrace of mature testes occur very seldom.

g. The size and shape of the seminal vesicles and of the seminal receptacle is strictly related to the degree to which they are filled with semen and may vary so greatly that it is irrelevant to give their dimensions as a taxonomical feature.

The above collection of features cannot pretend to exhaust the whole problem. The division into premanent, plastic and physiologically variable features was meant only to show a certain gradation in variability as observed in the material examined. This division cannot hold good with respect to all *Hymenolepididae*, not even to all those living in *Anseres*, because it is based only on the original material examined by the present author and covering merely part of the recorded tapeworms of this systematic group. There are no absolutely constant features. Those I found to be permanent may prove plastic in other species. When the scale of individual variability of various species is known in detail it will be possible to trace the inter-specific boundaries. In view of the present state of the knowledge of *Hymenolepididae* many incomplete descriptions are

made, their diagnoses being based upon plastic features, variable to too high a degree to be considered characteristic of the species. What is necessary ultimately to trace sufficiently sharp inter-specific boundaries is taking into account a whole complex of anatomical and ecological features in my opinion. It will be possible more fully to treat the species problem from the point of view of individual variability and on the evidence of the tapeworm materials to embark upon the explanation of the character, sharp or gradual, of the crossing of the inter-specific boundaries only when these questions are considered in their inter-relation. The anatomical examination of the variability of mature specimens living in the definitive host may be treated only as a small fragment of this problem.

VII. Decription of Species in Detail

Classis *Cestoidea* Rudolphi, 1808
Subclassis *Cestoda* Gegenbaur, 1859
Ordo *Cyclophyllidea* Braun, 1900
Subordo *Hymenolepidata* Skrjabin, 1940
Familia *Hymenolepididae* Fuhrmann, 1907
Subfamilia *Hymenolepidinae* Perrier, 1897
Tribus *Aploparaksaea* Skrjabin et Mathevossian, 1941
Genus *Aploparaksis* Clerc, 1903

Aploparaksis elisae Skrjabin, 1914

Hosts: *Nyroca ferina* (L.), *Nyroca rufa* (L.) (new host).

Frequency and time of occurrence, as observed by the present author: in one *Nyroca rufa* (L.) aut the twenty-three examined (4.3%) I found three specimens of this tapeworm at Drużno Lake in September.

Geographical distribution: South Kazakhstan, Poland (Drużno Lake). The tapeworm has so far not been found in Poland.

Localization: intestine.

Morphology: The structure, number and dimensions of the hooks and the structure of the strobila of the species closely resembles *Diorchis (D.) nyrocae* Yamaguti, 1935. It is easy to confuse the two species since the genital glands of *Apl. elisae* are so located in early stages of development that the analage of female glands as a whole and the developing testis as another whole both resemble two testes in the proglottid. Only in the farther proglottids behind

the scolex can it be seen that the porally situated anlage of female glands differentiate into a vitelline gland and an ovary, while the antiporally situated formation is a testis. The fact that the suckers are not armed with spines is not a feature of great taxonomical value as the armature easily scales off in *Diorchis (D.) nyrocae*.

REFERENCES

1. Skrjabin, 1914 c, pp. 451—453, Fig. 40—43. 2. Fuhrmann, 1932, p. 143. 3. Joyeux & Baer, 1936, p. 253, Fig. 232. 4. Skrjabin & Mathevossian, 1945, pp. 348—349, Fig. 286.

Aploparaksis furcigera (Rudolphi, 1819)

Synonyms: *Taenia furcigera* Rud., 1919; *Taenia rhomboidea* Dujardin, 1845; *Dicranotaenia rhomboidea* Railliet, 1893; *Dicranotaenia furcigera* Stiles, 1896; *Aploparaxis rhomboidea* Linstow, 1905; *Hymenolepis furcigera* Railliet, 1899, nec *Hym. (Drepanidotaenia) furcigera* Cohn, 1901; *Haploparaksis furcigera* Fuhrmann, 1926; *Aploparaksis pseudofurcigera* Skrjabin et Mathevossian, 1945.

Hosts: *Anas formosa* Georgi, *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.), *Dafila acuta* (L.), *Netta rufina* (Pall.), *Nettion crecca* (L.). *Nyroca ferina* (L.).

Frequency and time of occurrence, as observed by the present author: In fifteen out of seventy-seven *Anas platyrhynchos* examined (19.5%) I found one to twenty-five specimens in one host in the District of Białystok, in that of Warsaw and at Drużno Lake in April, July, August, September, October and November. In nine *Anas platyrhynchos dom.* (L.) out of the one hundred examined (9%) I found one to seventy specimens in one host in the Districts of Lublin and Bydgoszcz in May, September, October and November. In one *Nettion crecca* (L.) out of the seven examined (14.2%) I found two specimens in the District of Białystok in October. In one *Anser anser dom.* (L.) (new host) out of the 230 examined (0.4%) I found one specimen of this species of tapeworm (in rectum) in the Lublin slaughter-house in the middle of December.

Geographical distribution: Europe (Germany, Poland, the Soviet Union), Asia (Syberia), America.

Localization: rectum and ceca.

Morphology: The dimensions as found by Skrjabin and Mathevossian (1945) are given alongside of those stated by the present author in brackets. The length of wholly mature specimens is 18 to 34 mm (10 to 35 mm) and the maximum width 0.7 to 1.1 mm

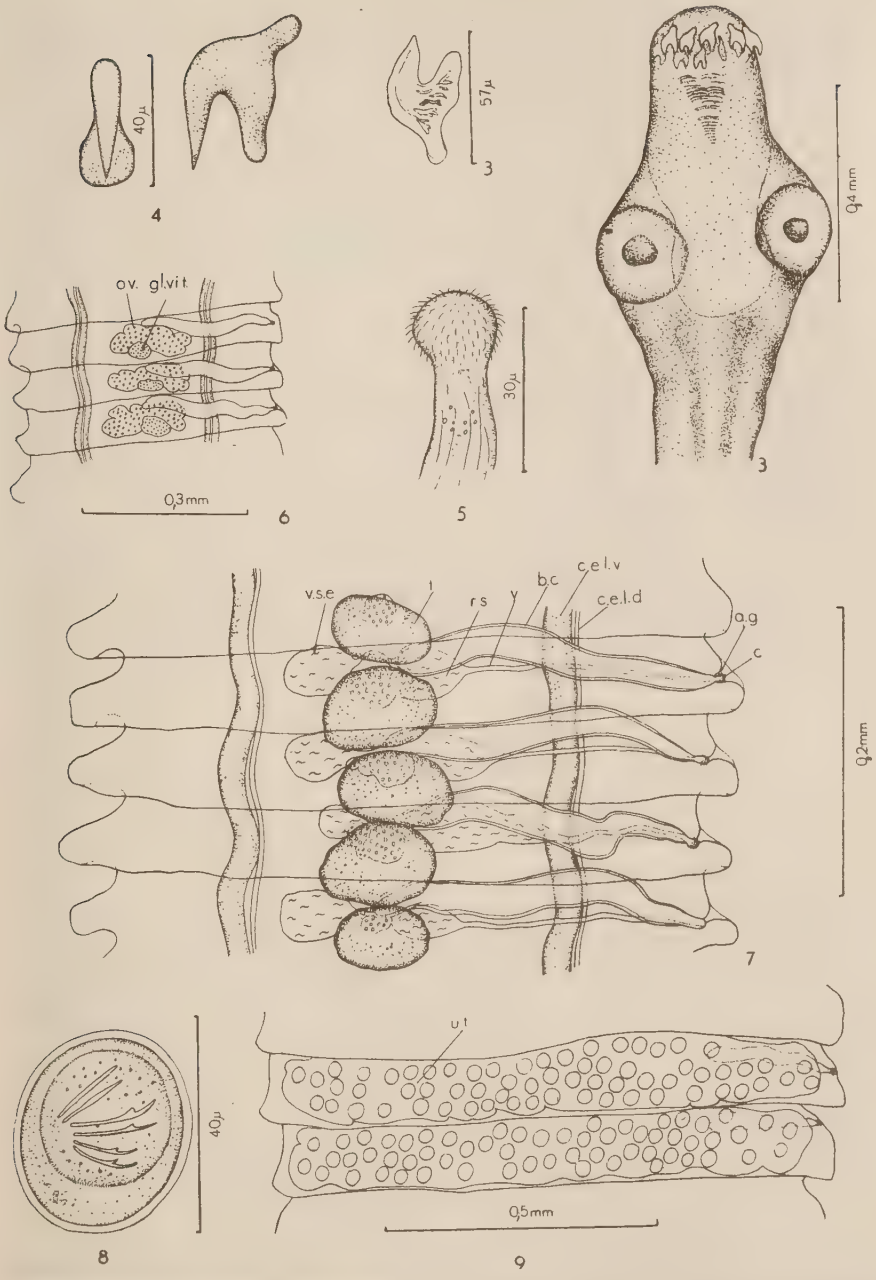

Fig. 3—9. *Aploparaksis furcigera* (Rudolphi, 1819). 3. Scolex with extruded rostellum. 4. Two rostellar hooks; front and side views. 5. Extended cirrus. 6. 'Female' genital proglottids. 7. 'Male' genital proglottids. 8. Egg. 9. Mature uterine proglottids.

Abbreviations — see p. 357.

(0.5 to 1.0 mm); (in the original work the figures were 0.5 to 0.1 mm, which is surely a misprint). The diameter of the scolex (Fig. 3), amounts to 420 to 510 μ (460 to 520 μ) that of the rostellum is 190 to 230 μ (220 to 250 μ). Ten rostellar hooks of the coronulus type of a length 52.5 to 57.0 μ, 54.7 μ on the average (47 to 58 μ). The guard of the rostellar hook is flattened dorso-ventrally, and viewed from above resembles a spade (Fig. 4). The unarmed suckers are 140 to 174 μ in diameter (180 μ). Cirrus, according to Skrj. & Math. (1945), unarmed, 9.7 μ in diameter. This seems to refer to a retracted, since, as I observed in many preparations, this organ, when extended, has the shape of a cylinder with a sphericial terminal (Fig. 5). The cylindrical basal portion of the cirrus is unarmed and maesures 9.5 to 10.2 μ in diameter, while the spherical terminal is armed with delicate thin hairs about 3 μ in length. The armed spherical part of the cirrus has a diameter of 14 to 16 μ. The cirrus sac measures 180 to 283 μ in length and 22 to 31 μ in diameter (according to Skrj. & Math. in *Apl. pseudofurcigera* it measures 150 μ in length and 22 μ in diameter, is poorly muscled and its dimensions greatly vary as the degree to which the internal seminal vesicle is filled with sperm). Eggs, spherical or slightly oval, 32 to 38 μ (36 μ) in diameter. Embryonic hooks, about 15 μ (14 μ) in length. Skrjabin and Mathevossian described a new species in 1945 which differs from *Apl. furcigera* (Rud.) in three features: 1. the shape of the handle of the rostellar hook supplied with a slightly protruding terminal; 2. the length of the hooks (63 μ); and 3. the size of the testes, 67 to 72 μ in diameter, while the *Apl. furcigera* testes are said to measure 45 μ in diameter. I found in my own material that the terminal of the handle of the rostellar hook had the shape of a small hood which might resemble the process drawn on the handle of the hook of *Apl. pseudofurcigera* by its authors. The size of the testes in the specimens I examined varies from 40 to 80 μ in diameter (Fig. 7), the big testes which occupy almost the whole length of the proglottid being transversely oval. The length of the hooks in the specimens I examined never exceeded 57 μ, yet I believe that this one difference does not supply a basis for regarding *Apl. pseudofurcigera* as a separate species and consequently I consider this species as synonym of *Apl. furcigera* (Rudolphi, 1819).

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6. Railliet, 1899. 7. Cohn, 1901, p. 326. 8. Linstow, 1905b, pp. 359—361, Fig. 8—9. 9. Lühe, 1910b, p. 55, Fig. 29. 10. Baylis, 1919, pp. 512—513, Fig. 8. 11. Fuhrmann, 1926, p. 92. 12. Gąsowska, 1931, p. 605. 13. Fuhrmann, 1932, p. 143. 14. Davies, 1938, p. 281. 15. Skrjabin & Mathevossian, 1945, pp. 349—351, Fig. 288—289, pp. 360—361, Fig. 301. 16. Mathevossian, 1946, pp. 183—184, Fig. 5.

Aploparaksis stefańskii Czapliński, 1955

Host: *Anas platyrhynchos dom.* (L.).

Frequency and time of occurrence: In one *Anas platyrhynchos dom.* (L.) out of the one hundred examined I found eighteen individuals in May.

Geographical distribution: the neighbourhood of Zamość, Poland.

Localization: small intestine.

Morphology has been worked out and published by the present author in the Acta Parasitologica Polonica. The great similarity of many features of this tapeworm to *Diorchis (D.) nyrocae* Yamaguti, 1935, made it necessary to compare both the species I present on p. 212. As the total preparations were not clear enough I made in addition a number of serial microtomic slices in the dorso-ventral plane. This plane of section distinctly shows the only testis in the proglottid and the proportions of its size to the lengths of the proglottids. These observations confirm my previous description and drawings.

REFERENCES

1. Czapliński, 1955, pp. 303—318, Fig. 1—11.

Tribus *Diorchaea* Skrjabin et Mathevossian, 1941

Diorchis (Diorchis) inflata (Rudolphi, 1819)

Hosts: *Nyroca rufa* (L.), *Nyroca ferina* (L.), *Fulica atra* (L.) is according to the literature a typical host. *Diorchis (Diorchis) inflata* (Rudolphi, 1819) was found first in *Nyroca ferina* by Dubinina, (1935), and in *Nyroca rufa* by the present author at Drużno Lake.

Frequency and time of occurrence: In two *Nyroca rufa* (Linn.) out of the twenty-three examined (8.7%) two to 176 specimens were found in one host at Drużno Lake (Mazury, Poland) in September.

Geographical distribution: Eurasia, Africa (Egypt).

Morphology: *Diorchis (D.) inflata* used to be ranked (Skrjabin and Mathevossian, 1945) to the subgenus *Nudiorchis* Skrjabin et Mathevosssian, 1945 as it has no armature on the

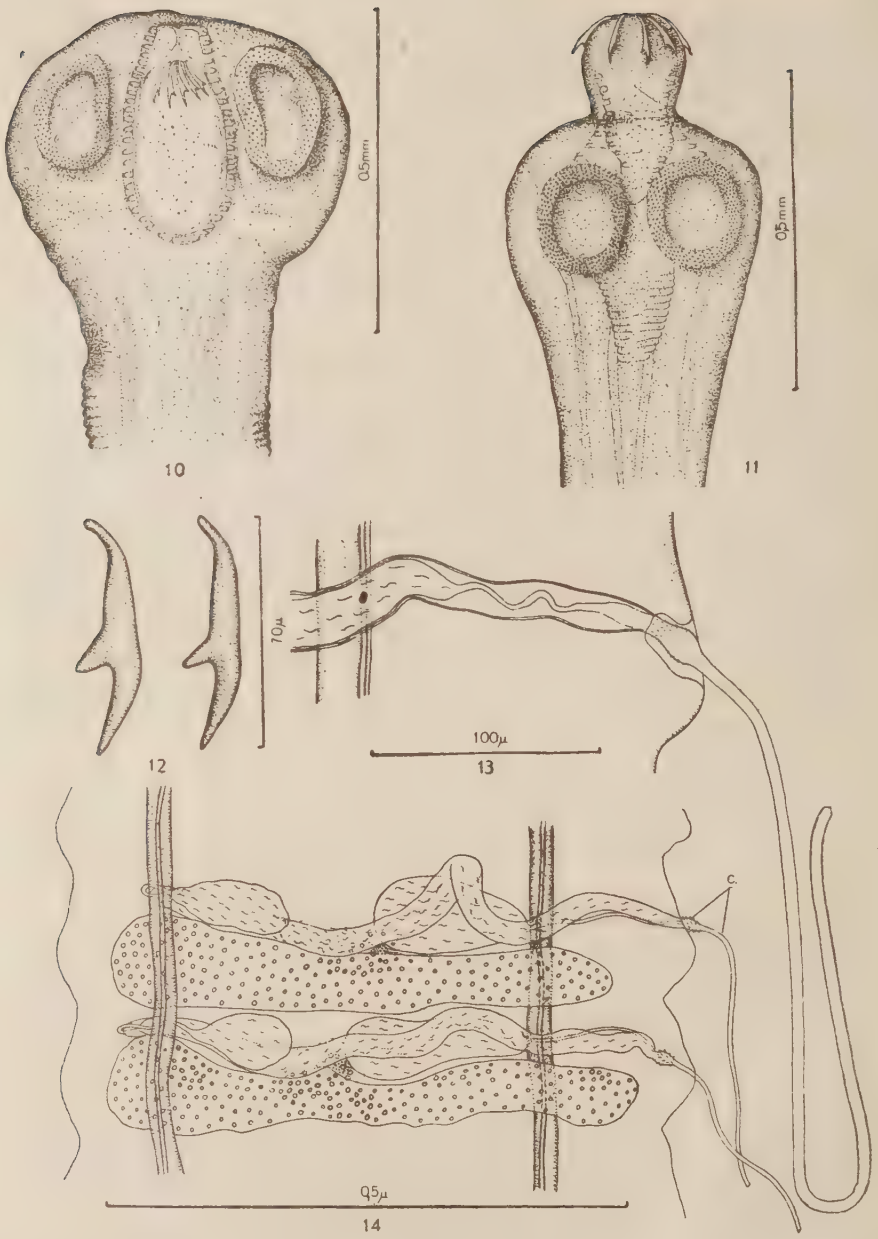

Fig. 10—14. *Diorchis* (*D.*) *inflata* (Rudolphi, 1819). 10. Scolex with retracted rostellum. 11. Scolex with extruded rostellum. 12. Rostellar hooks. 13. Genital atrium with extended cirrus. 14. Young uterine proglottids.

suckers. Dubinina (1953) speaks of the subgenus *Diorchis* Mathevossian, 1946 in her work referring to a publication by Mathevossian in the Helmintologitchesky Sbornik of 1946, in which the latter presented her conception of a division of the genus *Diorchis* Clerc, 1903 into the two subgenera appeares in first in 1945 (Skrjabin and Mathevossian) the date of 1945 ought to be accepted and the authorship ot the new subgenera ascribed to Skrjabin and Mathevossian, 1945. These authors (pp. 366 and 380) ascribe the authorship of the above subgenera to Mathevossian, 1945, yet they seem to base themselves upon a manuscript they leave out in their list of references. Dubinina (1953) found that the suckers were armed in this species and included it to the subgenus *Diorchis* Skrjabin et Mathevossian, 1945. In a few specimens out of the over forty minutely examined from this point of view I also found that the margins of the suckers were armed with small spines visible only when strongly magnified (Fig. 10 and 11). Judging by the length of the hooks (23 μ), the description of *Diorchis inflata* (Rudolphi, 1819) (Mayhew 1925 and 1929 makes it Rud., 1809) quoted by Mayhew (1925, 1929) concerns *Diorchis jacobii* Fuhrmann, 1932). Some particulars of the structure of *D.(D.) inflata* which, in accordance with the present criteria of distinguishing species, may apparently justify the classification of the specimens I examine as a new species (the length of the cirrus sac), and hardly exact descriptions I know from the literature, both make me inclined briefly to present the results of my own examinations. The length of immature specimens with the young uterine proglottids (without oncospheres) varies from 70 to 99 mm, their maximum width from 0.68 to 0.99 mm. According to Lühe (1910) the length of the specimens amounts to 100 mm, their maximum width 2.0 to 3.0 mm. Scolex 290 to 387 μ in diameter and 295 to 394 μ in length (according to Schultz, 1940, 289 μ in diameter). Rostellum, armed with a single crown of ten hooks of the diorchis type, is 66.4 to 73.2 μ long; according to Schultz (1940) 73 μ. According to the measurements I took of thirty specimens the average length of the hooks amounts to 71.8 μ (Fig. 12). The rostellum is 80 to 128 μ in minimum diameter and 120 to 160 μ long. The rostellar pouch is strong-muscled and reaches beyond the back margins of the suckers. The suckers are armed with numerous small spines on their margins. In most of the specimens examined the armature of the suckers is worn off. Collum

200 to 270 μ wide. The genital atrium located in the middle of the right margin of the proglottid. The cirrus (Fig. 13) enlarged like a club and armed with very small spines at its base, where it is 12 to 15 μ in diameter, tapers into a thin unarmed elongated part, which, when fully extended, reaches 570 μ in length and 4 to 5 μ in diameter. According to Krabbe (1869) and Schulz (1940) the cirrus is 550 μ long and 4 μ in diameter. The cirrus sac is elongated, cylindrical, slightly tapering in its poral portion, poorly muscled, runs dorsal to the poral excretory canals and in most specimens crosses also the antiporal excretory canals from the ventral side (Fig. 15). The cirrus sac is 32 to 48 μ in diameter by 510 to 726 μ in length. The length of the cirrus sac in proportion to the width of

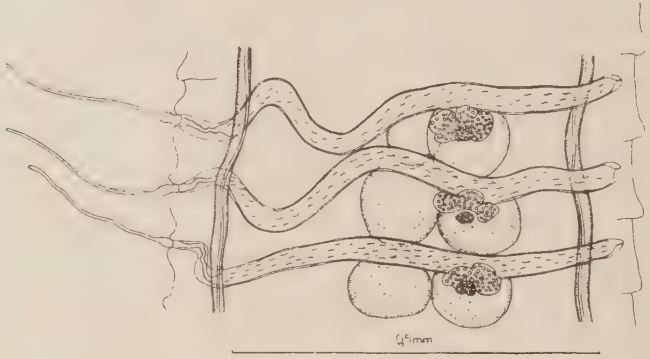

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Fig. 15. *Diorchis (D.) inflata* (Rudolphi, 1819). Hermaphrodite genital proglottids.

the proplottids examined leaves room for the supposition that these specimens belong to a species unknown hitherto. Yet it should be borne in mind that the size of the cirrus sac is a more constant feature than the size, and particularly the width, of the proplottids. That is why the cirrus sac in the proglottids of full-grown wide specimens reaches only half way through the width of the proplottid (according to Schultz, 1940; Skrj. & Mathevossian, 1945; Lühe, 1910), while in narrow under-grown ones it covers the whole width of the proglottid or is even longer and then it has an undulatory course (Fig. 14 and 15). Its undulatory course and even a tendency to form a loop are not important here as significant features as it is in some other tapeworms, e. g., *Sobolevicanthus octacantha* (Krabbe, 1869), but are due to the tapering of the proglottids.

The tapering of the proglottids may be due to a denser population or different conditions of the environments which *Nyroca rufa* (L.), an atypical host of the tapeworm in question, probably is. The internal seminal vesicle fills up almost the whole of the dorsal side of the antiporal portion of the cirrus sac (Fig. 14). The round testes 56 to 120 μ in diameter, 105 μ on the average, lie on a line across the central area of the proglottid. A thin-walled vagina runs straight, parallel to the cirrus sac or forms slight curves and enlarges into a transversally located oval seminal receptacle occupying the space between the poral excretory canals and the central line of the proglottid. Ovary trilobate. An oval compact vitelline gland measures 95 to 120 by 42 to 64 μ and is located ventral, seldom dorsal, to the ovary. The vitelline gland usually lies on the line of the antiporal testis, shifting close to the central line of the proglottid in old proglottids. A sacciform uterus occupies almost the whole width of the proglottid.

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Diorchis (Diorchis) nyrocae Yamaguti, 1935

Synonyms: *Diorchis (D.) skrjabini* Udinzew, 1937; nec *Diorchis (D.) nyrocae* Long et Wiggins, 1939; *Diorchis (D.) abuladze* Krotow, 1949.

Hosts: *Anas platyrhynchos* (L.), *Dafila acuta* (L.), *Fuligula fuligula* (L.), *Fuligula marila* (L.), *Netta rufina* (Pall.), *Nettion crecca* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), (new host), *Querquedula querquedula* (L.), *Spatula clypeata* (L.), *Tadorna tadorna* (L.).

Frequency and time of occurrence, as observed by the present author: in ten *Anas platyrhynchos* (L.) out of the seventy-seven examined (12,9%) two to fifty specimens were found in one host in July, August, September, and November. In the only *Fuligula fuligula* (L.) examined I found fourteen specimens at Drużno Lake. In three *Nyroca ferina* (L.) out of the six examined (50%) six to 38 specimens were found in one host in July and August. In eight *Nyroca rufa* (L.) out of the twenty-three examined (34.7%) two to 178 specimens were found in one host in July, August and September. In three *Querquedula querquedula* (L.) out of the fourteen examined

(21.4%) 15 to 32 specimens were found in one host in August and September.

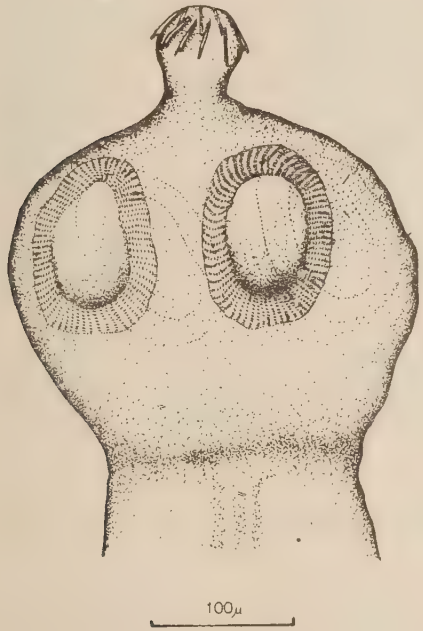
Geographical distribution: Asia (Japan and Syberia), Europe (the Soviet Union, Poland).

Localization: small intestine and ceca. According to Udinzew (1937) rectum as well.

Morphology and variation of this species was exhaustively treated by Yamaguti (1935), Udinzew (1937) and Dubinina (1953). On the basis of my observations I support Dubinina's (1953) opinion on the identity of *Diorchis (D.) skrjabini* and *Diorchis (D.) abuladze* with *Diorchis (D.) nyrocae*. Yet although my material was abundant I failed to observe so great variation of the shape of the hooks as Dubinina (1953, p. 154, Fig. 20) did. Still, it seems probable.

Among little known particulars of the structure of the tapeworm in question attention should be paid to the vagina, the copulatory portion of which shows the presence of a muscular layer stretching over nearly a score of microns from the genital atrium (Fig. 18). The seminal receptacle sometimes reaches an enormous size and fills up most of the length of the poral half of the proglottid (Fig. 17). The cirrus is cylindrical at the base and armed with small spines pointing backwards, their diameter being 8 μ on the average; it then passes into the slightly enlarged unarmed portion, 10 to 12 μ in diameter, ending in a cone. The maximum length of the cirrus is about 35 μ. Both the shape and the size of this organ, and a number of other features of *Diorchis (D.) nyrocae*, e. g. the scolex (Fig. 16), closely resemble the *Aploparaksis stefańskii* Czapliński, 1955, tapeworm, described by the present author, which was pointed out by Spassky in a talk with the present author. However apart from the essential difference between the two species, i. e., the presence in every proglottid of two testes in one of the species and of one testis in the other, the following features remain which allow to distinguish them: 1. the female genital glands in the genital proglottids always lie centrally in *D. (D.) nyrocae*, while in *Aplop. stefańskii* they are first shifted in the antiporal direction and only in older genital proglottids begin to occupy a central position pushing the testis in the poral direction; 2. the armature of the cirrus of *Apl. stefańskii* consists of bigger spines at the base and comparatively shorter towards the free end, while the cirrus of *Diorchis (D.) nyrocae* is armed with spines of the same length; 3. *Diorchis*

(D.) nyrocae eggs are somewhat shorter and thicker (80 by 25 μ) than those of *Apl. stefańskii* (83 to 89 by 17 to 19 μ); 4. the oncospheres of *Diorchis (D.) nyrocae* are spindle-like and measure 12 to 15 μ in diameter and 57 to 65 μ in length, while those of *Apl. stefańskii* are 9.3 to 10.7 μ thick and only 24 to 26.7 μ long.



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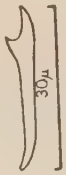

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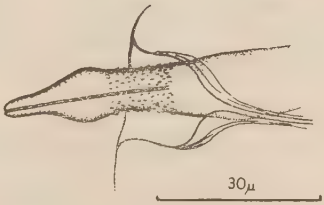

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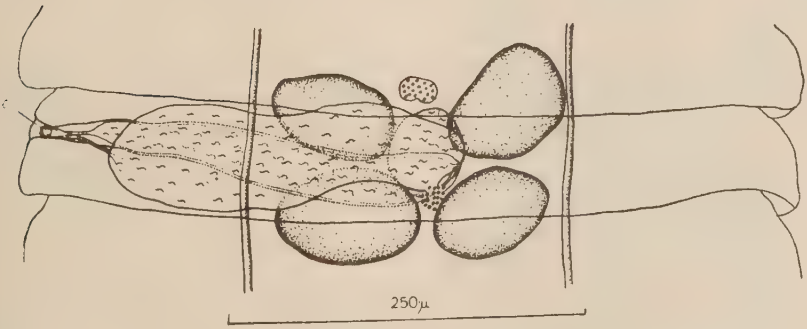

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Fig. 16—18. *Diorchis (D.) nyrocae* Yamaguti, 1935. 16a. Scolex with extruded rostellum. 16b. Rostellar hook. 17. Young 'male' genital proglottid with full-grown seminal receptacle. 18. Genital atrium with extended cirrus.

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1. Yamaguti, 1935, pp. 224—225, Fig. 76—78. 2. Udinzew, 1937, pp. 736—738, Fig. 1—5. 3. Yamaguti, 1940, pp. 207—208, Fig. 12—13. 4. Schultz, 1940, pp. 383, 384. 5. Skrjabin & Mathevossian, 1945, p. 368, Fig. 307, p. 374, Fig. 312. 6. Krotow, 1949. 7. Dubinina, 1953, p. 153, Fig. 20.

Diorchis (Diorchis) parvogenitalis Skrjabin et Mathevossian, 1945

Hosts: *Anas platyrhynchos* (L.), *Fuligula fuligula* (L.), *Nettion crecca* (L.), *Nyroca ferina* (L.), *Querquedula querquedula* (L.).

Frequency and time of occurrence as observed by the present author: in one *Nyroca ferina* (L.) out of the six examined (16,6%) I found seven specimens at Drużno Lake in July.

Geographical distribution: Europe (the Soviet Union, Poland), Syberia. The parasite is being recorded in Poland for the first time.

Localization: small intestine.

REFERENCES

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Diorchis (Diorchis) ransomi Schultz, 1940

Synonym: *Diorchis acuminata* Ransom, 1909.

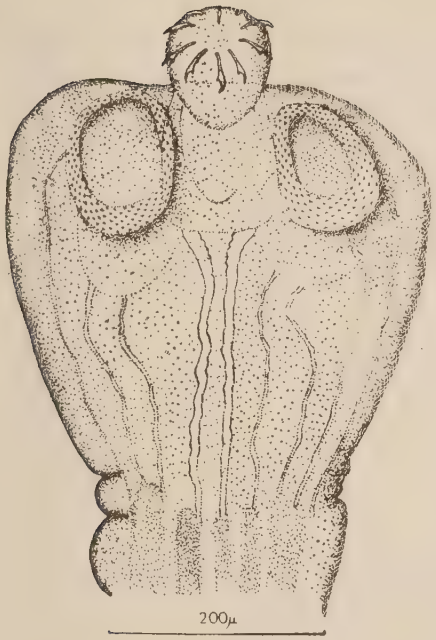
Hosts: *Aythya americana* (Eyton), *Nyroca ferina* (L.), *Nyroca rufa* (L.), (new host) and *Fulica atra* (L.), *Fulica americana* Gm. of the order *Ralliformes*. A typical parasite of *Fulica atra* (L.). Sporadically found in *Anseriformes*.

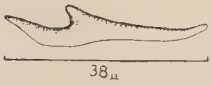
Frequency and time of occurrence, as observed by the present author: in two *Nyroca rufa* (L.) out of the 23 examined (8.6%) I found one to 141 specimens in one host at Drużno Lake in September.

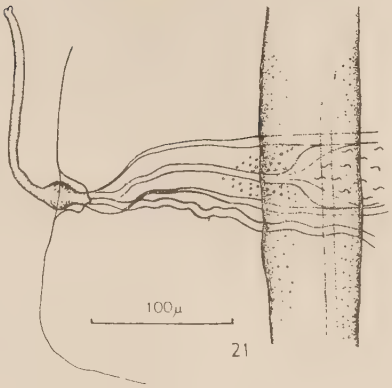
Geographical distribution: America (Nebraska, Philadelphia), Europa (the Soviet Union, Poland), Asia (Syberia).

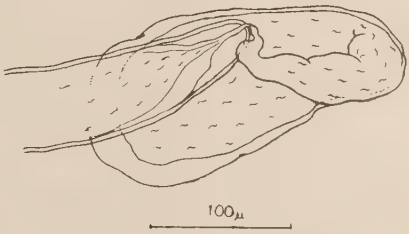
Localization: small intestine.

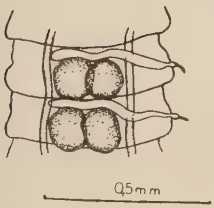
Morphology: Figures after Ransom (1909) are given in brackets following my own measurements. The length of fully mature specimens amounts to 135 to 164 mm (35 mm is that of an immature one), the maximum width is 1.8 to 2.5 mm (an immature one is 0.65 mm wide). Scolex (Fig. 19): 250 to 335 μ long (160μ) and 290

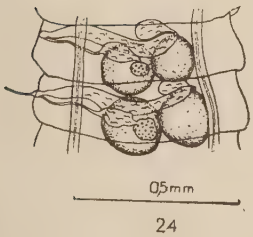












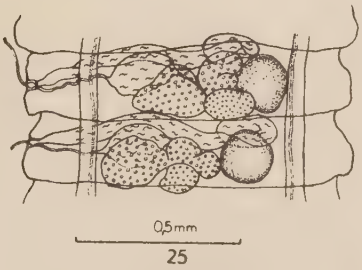


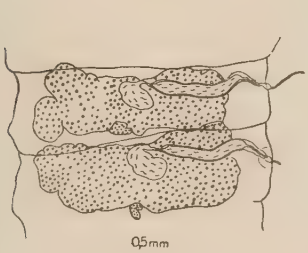
Fig. 19—25. *Diorchis* (*D.*) *ransomi* Schultz, 1940. 19. Scolex with extruded rostellum. 20. Rostellar hook, side view. 21. Genital atrium with extended cirrus. 22. Bottom of cirrus pouch and external seminal vesicle; ventral view. 23. 'Male' genital proglottids. 24. 'Male' genital proglottids with anlage of female genital glands. 25. Mature hermaphrodite genital proglottids.

to 380 μ (225—235 μ) in diameter. Rostellum cylindrical, enlarged at its top, 130 to 180 μ long (100 μ), 66 μ in diameter at its base (50 μ) and about 85 μ in diameter at its top (70 μ). The rostellum is armed with a single crown of ten hooks of the diorchis type 37.7 to 40.6 μ on the average 39 μ (38 μ) long (Fig. 20). Four suckers armed with many small spines on their edges, are round or slightly, oval in shape and 85 to 125 μ (80 μ) in diameter. (Fig. 19). The genital atrium forms a small funnel-like hollowing in the middle of the right margin of the proglottid.

The male genital system (Fig. 21—25). Cirrus (Fig. 21) armed (according to Ransom, 1909, unarmed, my observation confirming Dubinina's findings — 1953). It is difficult to measure the length of the cirrus as it is not known when it is fully extended. The maximum length of this organ as observed by the present author amounts to 184 μ (150μ). Judging from a drawing by Dubinina (1953) it may extend much more. The base of the cirrus, cylindrical and unarmed, measures 6 to 8 μ in diameter, then enlarges into a bulbous swelling carrying small spines and measuring 16 to 18 μ (14 to 16 μ). The long unarmed distal portion of the cirrus is of the same diameter as the base. In the genital proglottids with well-differentiated female glands the cylindrical cirrus sac reaches somewhat beyond the central line of the proglottid and measures, when its muscles are quite lax, 480 to 620 μ in length (180 to 280 μ) and 45 to 60 μ in thickness (45 to 55 μ). The cirrus sac is coated with a layer of muscles about 5 μ thick. I did not notice any thicker layer of muscles in the middle portion of the cirrus sac (the enlargement was observed by Ransom, 1909). I believe that the big difference in the length of the cirrus sac as observed by Ransom and myself is due to the fact that Ransom drew and measured the organ when its muscles were somewhat contracted. The internal seminal vesicle occupies most of the interior of the cirrus sac and the size of the latter depends on how much of the vesicle is filled with semen. The external seminal vesicle bends on to the dorsal side of the cirrus sac (Fig. 22) and the seminal duct linking both the vesicles enlarges over a very short distance after it leaves the cirrus sac. Two spherical testes lie in the back part of the central area of the proglottid and are 130 to 165 (100 to 130) μ in diameter.

The female genital system (Fig. 24—27). The thin-walled copulatory part of the vagina runs ventral and parallel to the cirrus sac and in the central area of the proglottid it enlarges without a marked

break into a large seminal receptacle lying behind the cirrus sac in the right half of the proglottid. The ovary is trilobate and directly behind it lies a spherical or irregularly oval vitelline gland 70 to 140 (45 to 60) μ in diameter. The vitelline gland sometimes shifts on to the ventral or, more seldom, dorsal side in relation to the back margin of the ovary. The vitelline gland disappears later than the ovary and it is still seen in young uterine proglottids. The mature sacciform uterus fills up almost the whole of the proglottid. The width and length of the mature uterine proglottids greatly varies and depends on how much of the uterus is filled with eggs. The greatest accumulation of eggs is most often found in the antiporal half of the proglottid. The eggs get outside owing to the breaking of the



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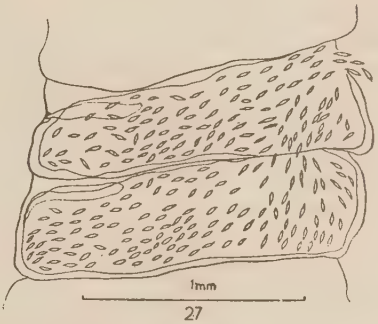

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Fig. 26 and 27. *Diorchis (D.) ransomi* Schultz, 1940. 26. Young uterine proglottids. 27. Mature uterine proglottids. Eggs getting at burst in antiporal margin of proglottid.

antiporal side of the proglottid. Frequently the phenomenon is observed of the eggs getting out of two neighbouring proglottids at the left side of only one of them. In this case the wall separating the two neighbouring proglottids breaks as well (Fig. 27). The eggs deformed in Canada Balsam cannot be measured or drawn.

The specific distinction of *D. (D.) ransomi* is based on the few features distinguishing it from *Diorchis (N.) acuminata* (Clerc, 1902), first of all upon: the presence of somewhat larger hooks, the armature of the suckers and the trilobate structure of the ovary. The anatomy of *D. (N.) acuminata* has as yet been inadequately worked upon and only a more exact treatment of it could finally decide the problem of the distinction of the two species.

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1. Ransom, 1909, pp. 42—48, Fig. 30—36. 2. Linton, 1927, pp. 51—52, Fig. 164—173, 3. Fuhrmann, 1932, p. 139, Fig. 114. 4. Joyeux & Baer, 1936, p. 248. 5. Schultz, 1940, p. 383. 6. Skrjabin & Mathevossian 1945, pp. 376—378, Fig. 314. 7. Dubinina, 1950. 8. Dubinina, 1953, pp. 155—156, Fig. 22.

Diorchis (Diorchis) stefańskii sp.n.

Hosts: *Anas platyrhynchos dom.* (L.), *Anas platyrhynchos* (L.). *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.), *Nyroca rufa* (L.).

Frequency and time of occurrence: In 15 *Anas platyrhynchos dom.* (L.) out of the one hundred examined (15.0 %) one to sixty specimens were found from March to October. In three *Anas platyrhynchos* (L.) out of the seventy-seven examined (4.0 %) one to 291 specimens were found in one host from July to November. In one *Chaulelasmus streperus* (L.) out of the six examined (17 %) one specimen was found at Drużno Lake on August and September 1953. In one *Nyroca rufa* (L.) out of the twenty-three examined (4.3 %) one specimen was found on September 1950 at Drużno Lake. In *Anser anser dom.* (L.) in one host out of the 230 examined (0.4 %) one specimen was found in the Lublin slaughter-house in December 1950.

Geographical distribution: Poland: Drużno Lake, Mazury; the neighbourhood of Toruń, Lublin and Warsaw.

Localization: small intestine.

Morphology: I give the species the name in honour of Prof. W. Stefański, D. Sc. The whole length measured in three fully mature specimens with uterine proglottids containing eggs with well-developed oncospheres varies from 188 to 279 mm, the maximum width is 1.35 to 1.71 mm. Scolex (Fig. 28) 280 to 358 μ long and 260 to 380 μ wide. The rostellum measures 126 μ in diameter at the top where the hooks are fixed at. The rostellum is armed with a single crown of ten hooks of the 'diorchis' type. The hooks were measured in twenty specimens. Their length varies from 66.4 to 74.1 μ, 70 μ on the average. The handle 48—50 μ in length, slightly curved on to the ventral side, the base of the handle somewhat flattened out. Guard, large, about 7 μ long, at its top flattened transversely to the long axis of the hook (Fig. 28). A small characteristic incision is seen at the base of the guard on the handle when it is viewed in profile. Blade 18.4—24.1 μ long. Suckers, large,

oval, armed, their size being 160 to 179 by 115 to 130 μ. The armature of the suckers often is worn off; I very often found specimens whose suckers were either unarmed or carried spines on part of its area only. Typical suckers are armed both on their margins and

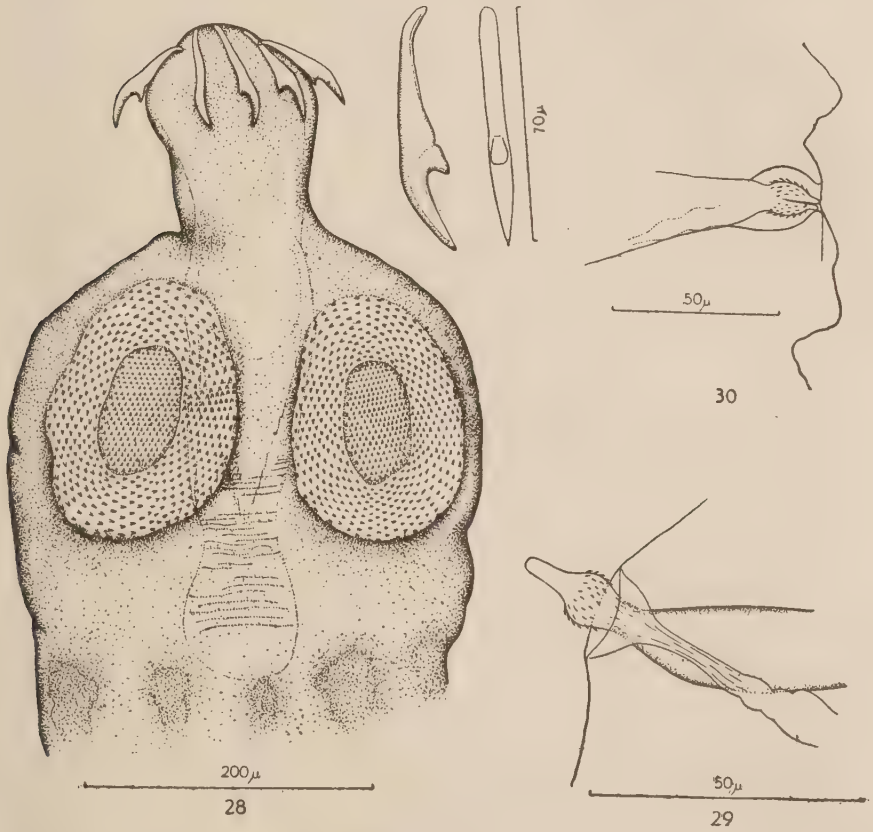


Fig. 28—30. *Diorchis (D.) stefańskii* sp. n. 28. Scolex with extruded rostellum. Next rostellar hooks; side and front views. 29. Ventral view of genital atrium. Cirrus extruded. 30. Dorsal view of genital atrium. Cirrus partly retracted.

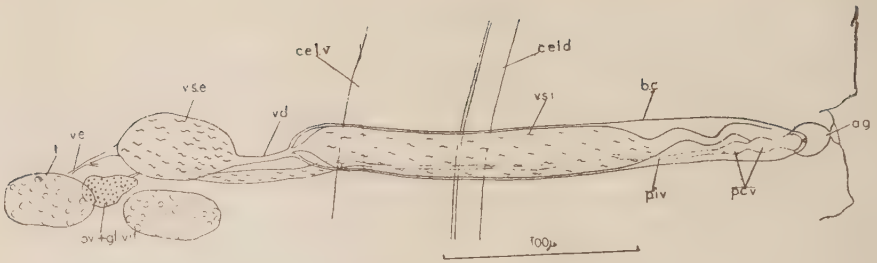
inside the acetabular cavity with very numerous inconspicuous spines forming a chequered pattern. Most spines on the suckers do not exceed about 2.5 μ in length. A thin and comparatively long rostellar pouch reaches backward beyond the back edges of the suckers. Collum, 190 to 280 μ wide and about 60 to 200 μ long. The

anlage of the proglottids is visible in some forms almost directly behind the scolex and only at distance of some 1.4 mm behind it in others. Proglottids wide and short. The width-to-length relation in the first distinct proglottids without genital glands amounts to 230 to 300 by 14 to 35 μ, in young 'male' proglottids, i.e., those without female genital glands, to 400 to 430 by 60 to 74 μ, in genital proglottids with well-developed female genital glands and disappearing testes 890 to 1044 by 65 to 80 μ, in young uterine proglottids 1350 to 1710 by 185 to 240 μ, in uterine proglottids with well-developed oncospheres 1040 to 1194 by 220 to 300 μ. The total number of proglottids in a fully mature specimen amounts to 3043 to 3189. The anlage of the cirrus sac is visible between the 170th and 200th proglottids behind the scolex, the testes appear between the 570th and 660th proglottids, the female genital glands between the 800th and 1400th proglottids, the vitelline gland and the ovary are differentiated between the 1700th and 1900th proglottids, a young uterus appears between the 2060th and 2230th proglottids, a mature uterus containing eggs with fully developed oncospheres between the 2910th and 3040th proglottids. Unilateral genital pores are located on the right side of the tapeworm in the middle of the margin of the proglottid.

Male genital system. When fully extended the armed cirrus is pear-shaped (Fig. 29) and measures 9 to 13 μ in diameter in the maximum part, 5 to 7 μ in diameter at the base, 2 to 3 μ in diameter at the top, while its length, measured from the bottom to the genital atrium, amounts to 23 to 28 μ. The cirrus armature consists of spines, small but conspicuous when strongly magnified, which appear only on the bulbous enlargement of the central portion of the cirrus. The basal and the apical parts of the cirrus are unarmed. In some specimens the spines wear off. The cirrus is seldom extended beyond the margin of the proglottid (Fig. 29), being most often placed in the genital atrium (Fig. 30). A shallow, funnel-like or bulbous genital atrium passes with no sharp break into a vagina (Fig. 29 & 30). The young cirrus sac cylindrical, then slightly enlarged in the antiporal portion in consequence of the development of the internal seminal vesicle, of thin walls with meagre muscles, is 26 to 46 μ in width by 220 to 265 μ in length, 38 by 238 μ on the average. It crosses the poral excretory canals from the dorsal side only in „male" genital proglottids with undifferentiated female genital gland. The

bottom of the cirrus sac (the antiporal or proximal portion) does not reach beyond the central line of a proglottid even in very young genital proglottids (Fig. 31). A fully developed internal seminal vesicle usually occupies 2/3 to 3/4 of the interior of the cirrus sac. The external seminal vesicle transversally oval and large, usually lies dorsal to the antiporal portion of the seminal receptacle on the line of the poral testis. The anlage of the cirrus pouch and the external seminal vesicle appear very early in the form of granulations taking dark stains from carmine and located in the middle portion of the proglottid. As they mature the granulations gather on the circumference of the accumulation forming something like an transversally oval vesicle which resembles a testis. In the farther proglottids this vesicle extends towards the genital atrium, narrows in the middle and passes into the external seminal vesicle which remains in the central field of the proglottid while somewhat approaching the poral excretory canals and into the cirrus sac stretching transverse to the genital atrium. The differentiation of the external seminal vesicle and the cirrus sac is accompanied by the atrophy of the above mentioned granulations, which make the outlines of these organs very inconspicuous. The testes are aligned transversally in the central area of the proglottid, one porally and the other antiporally. The transversally oval young testes (Fig. 31) have almost a round shape and a diameter of 38 to 60 μ, 52 μ on the average, when mature. The diameter of the testes does not exceed the length of the proglottid. The testes became largest and are most conspicuous in the young genital proglottids where no distinct differentiation of the genital female glands into a vitelline gland and an ovary has yet occurred. In most such proglottids only one testis is evident. What can be seen clearly is usually an antiporal testis in a few neighbouring proglottids, then two testes, then again an antiporal testis only and sometimes a poral one only. This phenomenon is related to a strong development of the external seminal vesicle and of the seminal receptacle both pressing against the testis in most proglottids, which makes one testis — because of its topographical position it is most usually the poral testis — appear less dinstinctly or perhaps even disappear (Fig. 32). From either testis goes one efferent duct (vas efferens) joining the other in one common seminal duct (vas deferens) near the external seminal vesicle.

Female genital system. The female genital pore lies at the bottom of the genital atrium, ventral or ventral and slightly dorsal to the



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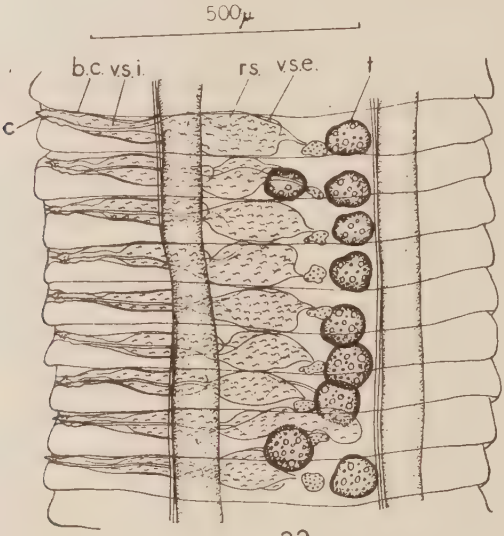

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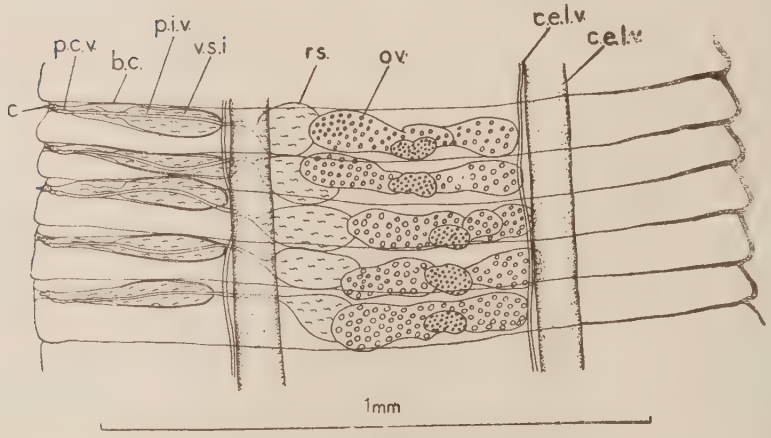

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Fig. 31—33. *Diorchis (D.) stefańskii* sp.n. 31. Fragment of 'male' genital proglottid with anlage of female glands. 32. A series of male' genital proglottids with full-grown seminal vesicles and seminal receptacle. In most proglottids only one antiporal testis is to be observed. 33. "Female' genital proglottids.

male genital pore. The anterior section of the vagina, the copulatory part (pars copulatrix) shows two characteristic enlargements the lumen of which is lined with a circular highly refractive layer.

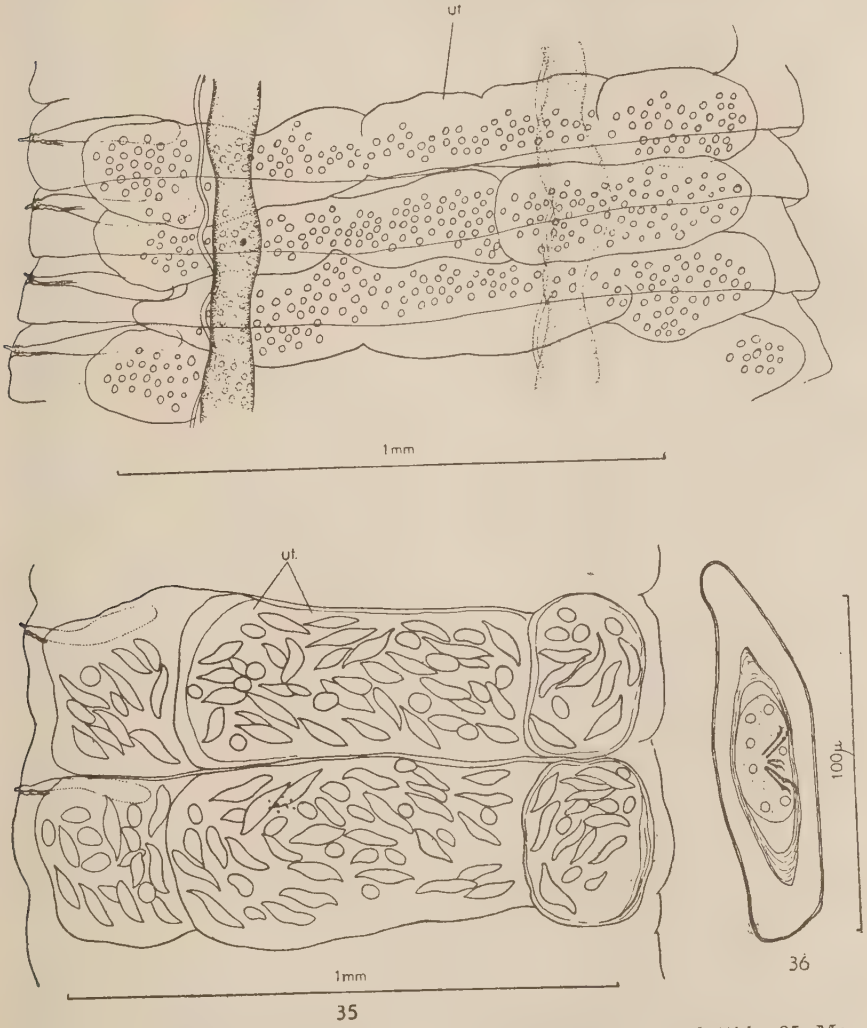

Fig. 34—36. *Diorchis* (*D.*) *stefańskii* sp. n. 34. Young uterine proglottids. 35. Mature uterine proglottids. 36. Egg.

The dimensions of the copulatory part of the vagina amount on the average to 28 µ in length and 8 to 11 µ in maximum diameter (Fig. 29 & 30). The vagina runs parallel or at first slightly oblique to the

cirrus sac. The intermediate part (pars intermedia) of the vagina is a thin-walled straight pipe dilating along the poral excretory canal into a seminal receptacle, spindel-like at first and then, in further more mature proglottids, longitudinally oval and well-developed. The intermediate part of the vagina and the seminal receptacle, when slightly filled with semen, sometimes have an S-shaped curve, typically however they run parallel with the cirrus sac. The ovary, bilobate as a rule, occupies the central area of the proglottid between the poral and the antiporal excretory canals, is slightly shifted antiporally and lies transversally in the proglottid. The antiporal lobe of the ovary sometimes crosses the antiporal dorsal excretory canal and extrudes somewhat outside the left (antiporal) field. The lobes of the ovary are large, rounded, with no incisions or bifurcations. In some proglottids there appears a third lobe of the ovary which is a branch of the antiporal lobe. The third lobe is small and lies ventral to the antiporal lobe. The dimensions of the fully mature ovary amounts to 54 to 82 μ of the maximum width and 220 to 430 μ in length. A fully developed compact vitelline gland is irregularly oval, sometimes almost round, in shape, and lies in the central area of the proglottid somewhat closer to the antiporal excretory canals. The long axis of the vitelline gland lies transversally to the long axis of the tapeworm. The vitelline gland varies from 31 to 60 μ in width by 43 to 70 μ in length (Fig. 33). The shift of the vitelline gland and the ovary towards the antiporal excretory canals may be accounted for by a strong development of the external seminal vesicle and the seminal receptacle which occupy a part of the central area of the proglottid near the poral extretory canals. A sacciform uterus with few wide diverticles lies oblique to the excretory canals in the proglottids, viz., crosses the poral excretory canals from the dorsal side and the antiporal ones from ventral side (Fig. 34). A mature uterus containing eggs with well-developed oncospheres filles up the whole proglottid from the poral to the antiporal edges (Fig. 35). The dimensions of elongated, spindle-like eggs are: outer shell 25.6 to 31.0 by 83 to 115 μ, intermediate shell 15.3 to 18.7 by 64 to 71 μ, oncospheres 13.4 to 16.6 by 32.6 to 38 μ (Fig. 36). The measurements and observations were made on the material preserved and immersed in Canada Balsam. The embryonic hooks have a long thin handle much longer than the blade, and a small guard.

The excretory system consists of two pairs of longitudinal excre-

tory canals. The poral canals lie somewhat farther from the poral edge than the antiporal ones in relation to the antiporal edge and run ventral to the genital ducts. The longitudinal dorsal canals are 8 to 13 μ in diameter and are shifted somewhat porally to the thick ventral excretory canals located under them and measuring 60 to 80 μ in diameter. I observed no transverse excretory canals.

Differential diagnosis.

1. *Diorchis (Diorchis) americana* Ransom, 1909, differs from *Diorchis (Diorchis) stefańskii* sp.n. in having no incision on the base of the guard of the rostellar hook, the copulatory part of its vagina being smooth, tubular, thin-walled; its cirrus sac relatively strong-muscled; its cirrus thin and long and measuring 1,5 to 2 by 100 μ.

2. *Diorchis (Diorchis) flavescens* (Krefft, 1871) has a thin and long cirrus, 5,4 by 500 μ, armed with small spines; the cirrus sac 270 to 350 μ by 50 μ extends as far as the antiporal testis; the ovary is distinctly trilobate, the central lobe lying on the central line of tre proglottid and protruding. The findings on the length of the hooks of this species which is said to vary from 36 to 66 μ according to Tseng Shen (1932) call for confirmation. No incision on the base of the guard of the rostellar hook.

3. *Diorchis (Diorchis) formosensis* Sugimoto, 1934. The base of the handle of the rostellar hook is bent on to the ventral side almost at a right angle; there is no incision at the base of the guard; the cirrus is thin with no widenings, 84 μ long, unarmed; the ovary is slightly lobate. I took the comparative data from the works: Skrjabin & Mathevossian, 1945, pp. 372—374, and Schultz, 1940, pp. 386, 389, Fig. 12. As there are no more detailed data it is difficult to make any more exact comparative analysis, yet the above mentioned structural differences seem to be sufficient to say that *Diorchis (D.) stefańskii* sp.n. is a separate species.

4. *Diorchis (Diorchis) turkestanica* Skrjabin, 1914 has originally been described by the discoverer of the species as a variety of *Diorchis (D.) americana* var. *turkestanica*, Skrjabin, 1914, as it differed from *D. (D.) americana* Ransom, 1909 only in the presence of a large, about 90 μ long, widening of the copulatory part of the vagina. This widening is of a structure quite different from *Diorchis (D.) stefańskii* sp.n. in which it is in the shape of a formation, narrowed in the middle, about 30 μ, hardly wider than the vagina. For the other differences see Point 1 — *Diorchis (D.)*

americana Ransom, 1909. What is still to be explained is whether the *Diorchis (D.) turkestanica* (Skrjabin, 1914) cirrus is not, in contradistinction to *D. (D.) americana* Ransom, 1909, armed, since in many other representatives of *Hymenolepididae* this feature is correlative with the widening of the copulatory part of the vagina, often lined with a cuticular layer.

5. *Diorchis (Nudiorchis) bulbodes* Mayhew, 1929, has the cirrus with a large, judging from its drawing, longitudinally oval swelling the diameter of which is equal to about a half of the length of the proglottid; the swelling is armed with large spines; the uterus occupies only the central area of the proglottid between the longitudinal excretory canals; the cirrus sac reaches 1/2 the width of the proglottid, even of the uterine proglottid.

6. *Diorchis (Diorchis) inflata* (Rudolphi, 1819) has hooks with no incision at the base of the guard; the cirrus (according to Krabbe, 1869) is 550 μ long and 4 μ wide, enlarged at the base, unarmed; the cirrus sac reaches the centre of the proglottid and in forms of narrow proglottids (as I observed it) it even crosses distinctly the antiporal excretory canals; the vagina does not show any so characteristic and striking a feature as a strongly refractive enlargement of the copulatory part of the vagina in *Diorchis (D.) stefańskii* sp.n.; eggs 37 by 41 μ with long filaments at the poles, oncosphere oval, 17 μ in legth.

7. *Diorchis (Diorchis) longiovum* Schiller, 1953, has hooks with an elongated blunt guard with no incision at the base; the dorsal line of the guard is S-shaped, the base of the handle bent on to the ventral side almost at a right angle; the length of the hooks amounts to 57 μ; eggs spindle-like, strongly elongated, 15 by 90 μ; oncospheres 11 by 52,5 μ; the cirrus has no swelling and is armed, with large spines over one-third of its length when fully extended; ovary trilobate or irregular in shape; the cirrus sac extends almost as far as the antiporal excretory canals.

8. *Diorchis (Diorchis) tshanensis* Krotow, 1949, is distinguished by a different shape of the rostellar hooks and their size (55 μ in length); a very small cirrus sac (36 by 4 μ); the structure of the excretory canals of which the ventral and the dorsal ones are, judging from its drawing, almost of the same diameter.

9. *Diorchis (Diorchis) sobolevi* Spasskaja, 1950. The rostellar hooks are of a structure and size (66 μ in length) very similar to

D. (D.) stefańskii sp.n. yet with no incision at the base of the guard; the cirrus has a comparatively large swelling at the base and a very much elongated distal portion called by the author (probably wrongly) the cirrus stiletto; the vagina, judging from the drawing (no data in the description), does not show any cuticular enlargement in the copulatory part; ovary trilobate; the excretory longitudinal ventral canals have a comparatively small diameter, only twice as large as that of the dorsal canals; the cirrus sac of large specimens (150 mm long by 2.9 mm wide) extends beyond the central line of the proglottid and even reaches the antiporal excretory canals.

10. *Diorchis acicula-sinuata* (Rosseter, 1909) Schultz, 1940. (Syn.: *Hymenolepis acicula sinuata* Rosseter, 1909). The description is known to me only from the key drawn up by Schultz (1940), which makes it difficult for me to make any more exact comparative analysis. The strobila of this species is comparatively short (60 mm), its width amounts to 1,056 mm. The cirrus sac extends as far as the central line of the proglottid or farther on and so it may be assumed that it is (in proportion to the width of the proglottid) about twice as long as the cirrus sac of *D. (D.) stefańskii* sp.n. Its eggs are somewhat thicker than eggs of the above mentioned new species (91 μ long and 34 μ thick) while the oncospheres are longer and thicker (47 μ long and 17 μ thick).

Since *Diorchis (D.) stefańskii* sp.n. is very common, I suppose that it has not yet been distinguished by many authors of inventory works from *Hym. anatina*, because of a similarity of shape, dimensions, the number of hooks and the structure of the strobila.

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Diorchis (Nudiorchis?) danutae sp.n.

Host: *Nyroca rufa* (L.).

Frequency and time of occurence: in four *Nyroca rufa* (L.) out of the twenty-three examined (17.4 %) one to seven specimens in

one host at Drużno Lake in September and October, although most of the hosts mentioned were examined in July and August.

Geographical distribution: Drużno Lake (Mazury, Poland).

Localization: intestine.

Morphology: Five specimens were measured. Only two specimens were preserved whole, with scolices and rostellar hooks. The other specimens, eight in number, consisted from loose fragments of the strobila. It would have been difficult to make a whole of these fragments, on which a description could have been based of the whole tapeworm from head to last uterine proglottids. The whole length of a mature specimen varies from 106 to 179 mm. The maximum width is 1.1 to 3.3 mm. The scolex is 180 to 220 μ long and 250 to 275 μ in diameter (Fig. 37 and 38). The rostellum is 170 to 180 μ in length, 23 to 26 μ in minimum diameter and 45 to 55 μ in diameter at the top where the hooks are fixed on. The rostellar pouch does not reach the back edge of the suckers. The suckers hardly contrast with the surroundings and are oval. They measure 75 to 95 μ in width and 110 to 120 μ in length. I found no armature of the suckers and that is why I rank the species described to the genus and subgenus *Diorchis (Nudiorchis)* Skrjabin et Matevosssian, 1945. The rostellum is armed with a single crown od 10 hooks of a structure like the type of „diorchis" and „arcuatus". The length of the hooks varies from 25.5 to 27.6 μ. The length of the blade amounts to 5 to 6.5 μ, that of the handle 20.5 to 21.1 μ and that of the guard about 2.5 μ. The length of the guard is about equal to its width. The handle is strongly flattened out at its base. Collum 196 to 215 μ wide and 298 to 522 μ long. Proglottids wide and short. The width to length relation in the first distinct proglottids without genital glands amounts to 180 by 29 to 560 by 53 μ, of the young „male" genital proglottids, i.e., those without female genital glands to 0.7 by 0.074 to 0.85 by 0.108 mm, of the „female" sexual proglottids, i.e., those with well-developed female glands and disappearing tests 1.014 by 0.134 to 1.94 by 0.149 mm, of the young uterine proglottids containing eggs without well-developed oncospheres 1.074 by 0.077 to 3.34 by 0.223 mm, of the uterine proglottids with oncospheres and well-developed embryonic hooks 2.537 by 0.194 mm. The last uterine proglottids do not contain eggs, are strongly deformed, folded, shrunk, smaller as a rule, than the uterine proglottids filled with eggs. The total number of proglottids of a fully

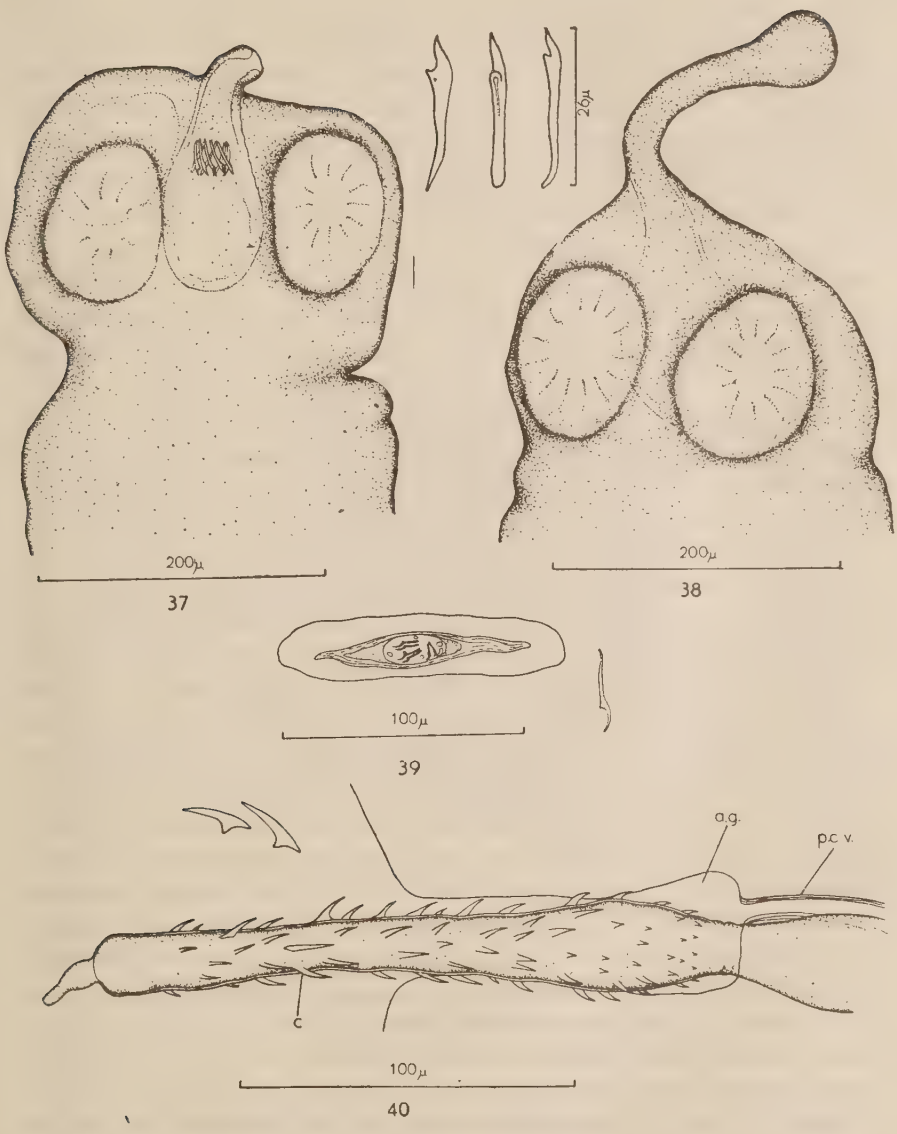

Fig. 37—40. *Diorchis (N.?) danutae* sp. n. 37. Scolex with retracted rostellum. Next rostellar hooks. 38. Scolex with extruded rostellum; no hooks. 39. Egg. Next embryonic hook. 40. Genital atrium with extended cirrus.

mature specimen is about 1250 to 1310. The anlage of the cirrus sac is to be seen in the form of granulations taking dark stain in the centre of the body of the tapeworm between the 46th and 80th proglottids behind the scolex. The testes appear between the 88th and 190th proglottids behind the scolex, the female genital glands between the 270th and 380th proglottids, the differentiation into the ovary and the vitelline gland becomes conspicuous between the 498th and 580th proglottids, a young uterus appears between the 646th and 930th proglottids, while an uterus with well-developed oncospheres between the 980th and 1250th proglottids. Genital pores unilateral, located in the front part of the right margin of the proglottid.

Male genital system. When fully extended, the armed cirrus measures 180 to 202 μ in length and 23 to 30 μ in maximum width. The unarmed base of the cirrus then gradually widens forming a small swelling armed at its base with small hooks which gradually become larger and reach a maximum length of 11 to 15 μ in central, slightly narrowed part of the cirrus. The distal (poral) part of the cirrus has at its top a pear-shaped unarmed terminal contrasting clearly with the rest of the cirrus by its delicate structure. The mild armed enlargement of the cirrus remains almost always hidden inside the genital atrium (Fig. 40). A comparatively small genital atrium (sinus genitalis) has the shape of a narrow hollowing (just a little wider than the widening of the base of the cirrus) reaching — this depends on the state of the contraction of the muscles — about 100 μ in the antiporal direction, from the right margin of the proglottid. The bottom of the genital atrium is flat and slightly concave. The cirrus sac (bursa cirri) elongated, cylindrical, meagre-muscled, crosses the poral excretory canals from the dorsal side although it never reaches the central line of the proglottid in large wide specimens even in the young genital proglottids with yet undifferentiated female genital glands. On the other hand, in small forms, with comparatively narrow proglottids the cirrus sac reaches beyond the central line of the proglottid and its bottom often lies on the line of the antiporal testis. The dimensions of the bursa cirri varies comparatively little, 59 to 82 by 470 to 597 μ and only in a low degree depend on the size of the tapeworm. In small tapeworms the dimensions of the cirrus sac amount on the average to 65 by 510 μ, while in large forms 70 by 550 μ, and in both cirrus sacs are found

of the same dimensions despite the large differences in the width and length of the proglottids in the same stage of maturity. The cirrus sac reaches from 1/2 to 1/5 the width of the proglottid, this depending on its maturity and size. In the last uterine proglottids the cirrus sac, shifted by the uterus filled up with eggs towards the poral margin, is small and shrunk. In relation to the amount of semen gathered in it the internal seminal vesicle occupies from

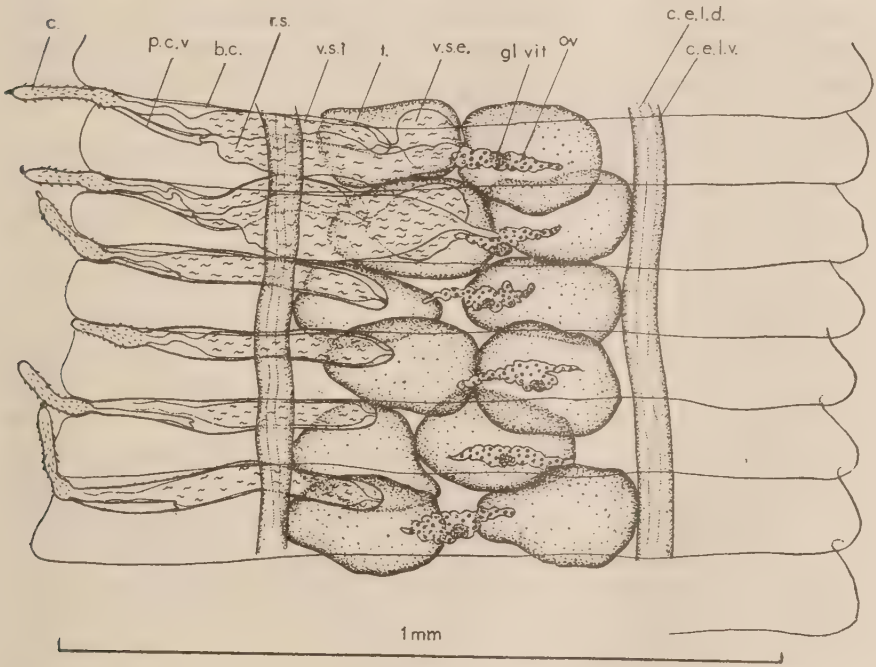

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Fig. 41. *Diorchis* (*N.?*) *danutae* sp.n. Hermaphrodite genital proglottids with female glands partly developed.

2/3 to 3/4 of the cirrus sac. The antiporal part of the internal seminal vesicle is separated from the bottom of the cirrus sac by a small free area crossed by the seminal duct enlarging outside the cirrus sac in the external seminal vesicle, irregularly spherical, lying dorsal to the cirrus sac or at the same hight (Fig. 41). In „female" genital proglottids with disappearing testes the external seminal vesicle and the seminal receptacle are chock-full of semen, tightly adhere

to each other and fill together the whole length of the proglottid pressing against the poral lobe of the ovary (Fig. 42). The transversally oval testes reach maximum dimensions of 190 to 254 by 110 to 180 μ in „male" proglottids (Fig. 41). The testes of the neighbouring proglottids overlap each other because the diameter of many testes is larger than the length of the proglottid. Both testes occupy the central area between the poral and antiporal excretory canals. One testis lies poral, the other antiporal or dorsal to the female genital glands. This is because young female genital glands lie centrally, or are shifted somewhat to the left towards the antiporal excretory canals. In genital proglottids with a fully developed vitelline gland and ovary the testes seem to disappear.

Female genital system. The female genital pore is located at the bottom of the sexual atrium, dorsal or ventral and somewhat backwards to the male genital pore. The vagina consists of the copulatory part, thick-walled, strong-muscled and stretching from the genital atrium over a distance of about 170 μ. This section of the vagina lies ventral or somewhat backwards to the cirrus sac and abruptly passes into the thin-walled, sometimes slightly bent, part and very soon, even before it reaches the poral excretory canals, it enlarges into a big elongated transversally situated seminal receptacle extending as far as the vitelline gland. A compact, diagonally oval, almost spherical or hour-glass-shaped vitelline gland reaches in the highest phase of development dimensions of 74 to 104 by 110 to 178 μ, and lies on the central line of the proglottid or is shifted somewhat left. The elongated ovary situated transversally in the central area of the proglottid consists, as a rule, of two lobes of approximately the same size, which, when fully developed reach as far as, or at times cross, the excretory canals. The central part of the antiporal part of the ovary is sometimes furnished with a small process jutting to the front of the proglottid or ventral to the maternal lobe. This process may be regarded as an under-developed rudimentary third lobe of the ovary. The poral lobe of the ovary is almost always pressed against by a large seminal receptacle filled with semen and the external seminal vesicle. This makes this lobe be less conspicuous than the antiporal lobe or seem completely absent. In contradiction to the more or less constant dimensions of the cirrus sac, the cirrus, and even, in a smaller measure, the vitelline gland, the dimensions of the ovary depend from

the size of the specimen examined in the same stage of maturity. In under-grown forms the dimensions of the ovary amount, on the average, 74 by 447 μ against 112 by 1044 μ in large forms. A sacciform uterus (Fig. 43), with few shallow and extensive diverticles widely communicating with its lumen, occupies almost the whole of the proglottid sticking out beyond the excretory canals. The antiporal part of the uterus approaches, as eggs mature, the antiporal

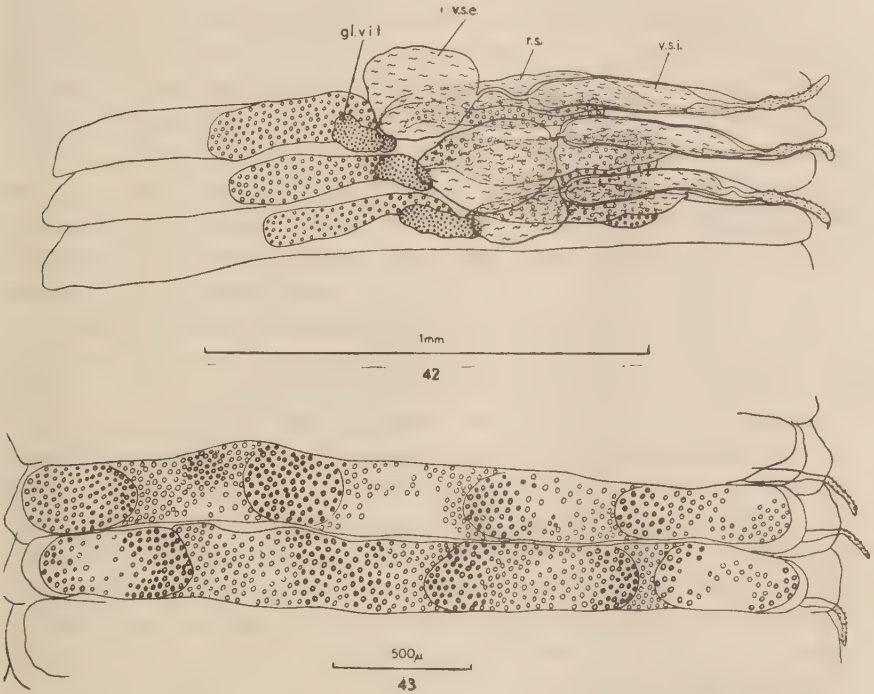

Fig. 42 and 43. *Diorchis (N.?) danutae* sp.n. 42. 'Female' genital proglottids. 43. Young uterine proglottids.

margin of the proglottid, till the left side of the uterine proglottid is broken open and mature eggs come outside. After the eggs are thus removed the uterus proglottids shrink and wrinkle but do not yet become detached from the whole strobila. The mature eggs (Fig. 39) examined only in the material fixed in Canada Balsam are oval in shape. Outer membrane of eggs, 23 to 27 by 112 to 124 μ; intermediate spindle-like membrane 13 to 15 by 90 to 98 μ; onco-

sphere 11 to 13 by 26 to 29 μ. The six embryonic hooks with a long handle, a thin blade bent dorsally and curved, and a very small guard measures about 10 u in length.

The excretory system consists of two pairs of longitudinal excretory canals. The ventral excretory canals are 42 to 50 μ in diameter, the dorsal ones 8 to 14 μ in diameter in young genital proglottids. The poral longitudinal excretory canals run dorsal to the genital ducts. No transverse excretory canals were observed.

The muscular system. As there was no adequate amount of material I did not obtain any microtomic slices and could not minutely examine the musculature. Hardly reliable observations of some total preparations make me think that bundles of internal longitudinal muscles appear in four pairs.

Differential diagnosis. As comparative material for this differential diagnosis I used the descriptions of all recorded (in the literature accessible to me) species of tapeworm of the genus *Diorchis* Clerc, 1903, both the subgenus *Diorchis* Skrjabin et Mathevossian, 1945, and the subgenus *Nudiorchis* Skrjabin et Mathevossian, 1945. The ascription of *Diorchis danutae* sp.n. to the subgenus *Nudiorchis* I base on the absence of the armature of the suckers in the only five specimens with scolices I possessed, and that is why this classification is conditional, subject to verification on a greater number of specimens, as the spines of the suckers wear off easily. I compare the new species described with whatever species I know from description of the genus *Diorchis* Clerc, 1903, which species are characterized by the presence of 8 to 10 restellar hooks 20 to 32 μ long irrespective, as a rule, of their shape which may be misrepresented by the writer. I give only most essential differences.

1. *Diorchis (Diorchis) nyrocae* Yamaguti, 1935 (Syn. *D. (D.) skrjabini* Udinzew, 1937) has a small cirrus of the average size 10 by 35 μ when fully extended, conical at the end, with no appendices, the base armed with very small spines to be seen only when strongly magnified. Cirrus sac considerably smaller.

2. *Diorchis (Diorchis) wigginsi* Schultz, 1940 (Syn. *D. nyrocae* Long et Wiggins, 1939). The cirrus sac extends from the genital atrium to the poral longitudinal excretory canals. No information on the structure of the cirrus. A small ovary consists of two to four lobes, and, judging from the drawing, does not reach

the size and shape characteristic of *D. (N?) danutae* sp.n. The vagina has and undulatory course and enlarges into a small spindle-like seminal receptacle only in the central area of the proglottid between the poral excretory canals and the vitelline gland, the copulatory part having thin walls with no noticeable musculature.

3. *Diorchis (Diorchis) vigisi* Krotow, 1949. Rostellum armed with eight hooks with a comparatively thick handle. No accurate information on the cirrus sac and none on the cirrus. The longitudinal excretory canals are of almost the same diameter. The slightly lobate uterus does not reach the margins of the proglottids. Eggs round. It does not say in the work whether they are ripe eggs with well-developed oncospheres.

4. *Diorchis (Diorchis) mathevossianae* Krotow, 1949. A little-known species, described only from two specimens. Eight hooks of the „diorchis" type with a thick handle and 20 μ long. The genital pores open only in the back third of the margin of the proglottid. Ovary spindle-like. Judging from the drawing the proglottids are comparatively longer than in *D. (N.?) danutae* sp.n.

5. *Diorchis (Nudiorchis) oschmarini* Sudarikow, 1950. Striking differences: the shape of the rostellar and embryonic hooks (the blade of almost the same length as the handle, the guard is long and thick, a specific enlargement on the sides of the handle near its base); cirrus elongated, frail, with no enlargements and armature; copulatory part of the vagina of thin walls; eggs oval. 28 to 34 μ in diameter according to the information from the text, but about 50 μ as judged from the drawing.

6. *Diorchis (Nudiorchis) acuminata* (Clerc, 1902). Cirrus sac slightly curved, small, thick-walled (as judged from the drawing), very wide in proportion to the length of the proglottid. As there is no information on the structure of the cirrus it can be supposed that this organ is small and inconspicuous. The female genital gland occupy 1/3 the width of the proglottid. The testes are smalll in proportion to the length of the proglottid and lie in its back portion.

7. *Diorchis (Nudiorchis) excentrica* Mayhew, 1925. Rostellar hook with a very well shaped guard of the length almost equal to that of the blade. Cirrus sac small, reaching only as far as the poral excretory canals. Cirrus small, with no enlargements and appendices, armed with very small spines throughout its length. The poral testis lies dorsal to the poral excretory canals. The antiporal lobe of the ovary crosses the antiporal excretory canals.

8. *Diorchis (Nudiorchis) jacobii* Fuhrmann, 1932 (Syn. *Taenia inflata* Jacobi, 1899 nec Rudolphi 1819, *Diorchis inflata* Clerc, 1903). The guard of the rostellar hook is small and somewhat alongated and lies parallel to the blade. Cirrus sac elongated, with an undulatory course surrounded with long glandular cells. Judging from the drawing the cirrus is thin, elongated, unarmed. Eggs spindle-like, 41 μ long; oncosphere with pointed poles.

9. *Diorchis (Nudiorchis) longicirrosa* Meggitt, 1927. Rostellar hooks not examined. Genital pores situated in the back part of the proglottid. The cirrus sac reaches almost the antiporal margin of the proglottid. The testes lie antiporally. The species has not been examined sufficiently and it is doubtful whether it is separate.

10. *Diorchis (Nudiorchis) microcirrosa* Mayhew, 1929. Hooks, with a strongly bent base of the handle and a large thick guard. Cirrus small, with bulbous enlargement, 5 μ in diameter (according to Skrjabin & Mathevossian, 1945). Eggs spindle-like, 65 to 80 by 12 to 19 μ.

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Diorchis (Nudiorchis?) spinata Mayhew, 1929

Host: *Chaulelasmus streperus* (L.)

Frequency and time of occurence: In one *Chaulelasmus streperus* (L.) out of the seven examined (14,3%) I found nine specimens at Drużno Lake in September.

Geographical distribution: North America, Europe (Poland). The parasite has not been recorded in the eastern hemisphere.

Localization: The intestine (the material was collected from all over the intestine not divided into sections before).

Morphology: Figures in brackets are quoted after Mayhew, 1929. The length of the wholly mature specimens amounts to 82 to 85 mm (80 to 122 mm), the maximum width 1.2 to 1.6 (1.3) mm. The scolex is 170 to 190 μ in length and 250 to 280 (250) μ in diameter

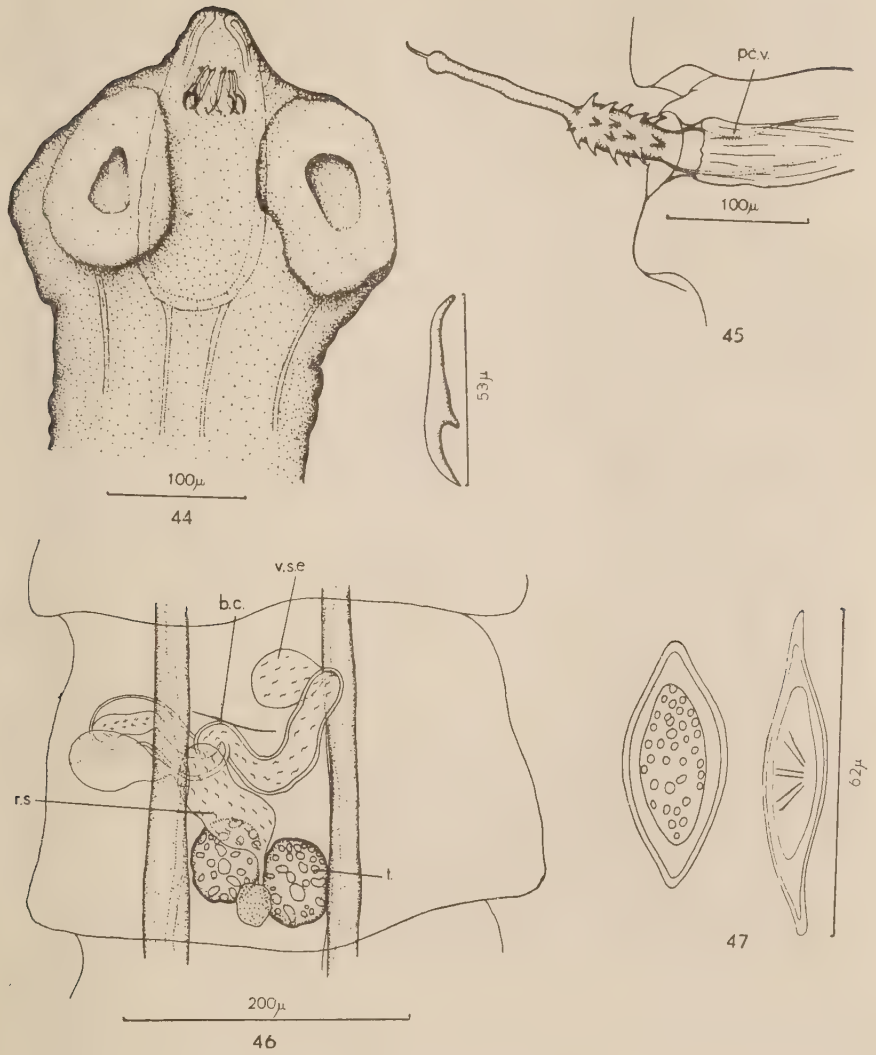
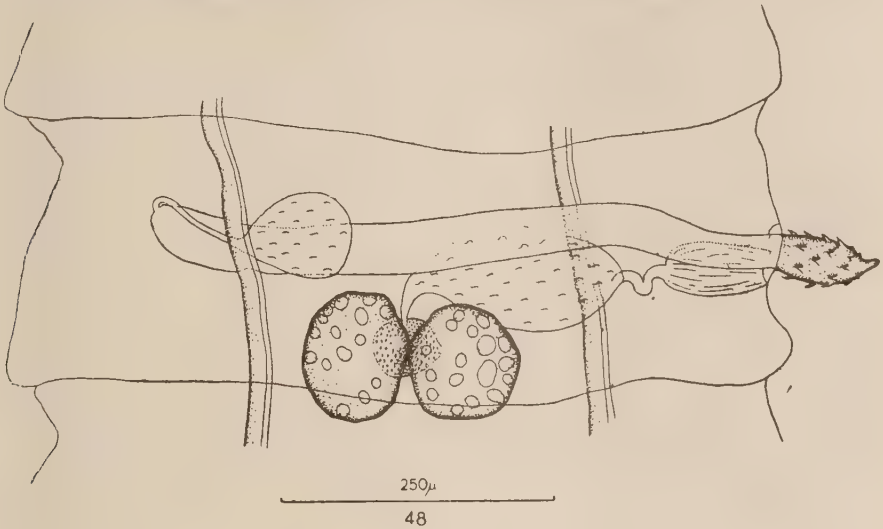


Fig. 44—47. *Diorchis (N.?) spinata* M a y h e w, 1929. 44. Scolex with retracted rostellum. Next rostellar hook. 45. Genital atrium with extended cirrus; a ventral view. 46. 'Male' genital proglottid with anlage of female glands. Testes not quite mature. 47. Young egg with no well-developed oncosphere and mature egg.

(Fig. 44). In all specimens the rostellum was retracted. The rostellar pouch reaches beyond the back edges of the suckers. Rostellum, armed with a single crown of ten hooks of the diorchis type 48 to 53 (46 to 48) μ, 51 μ long on the average. Suckers unarmed, oval, 80 to 90 μ in diameter of the shorter transverse axis and 125 to 140 μ in diameter of the longer longitudinal axis. A shallow genital atrium lies about half way through the right margin of the proglottid.

Male genital system. The wholly extended cirrus (Fig. 45) reaches 200 μ in length and including a thin tongue-like process at the top (150 μ). The shape of the cirrus is, as I observed it, somewhat different from what Mayhew had noticed (1929). He seems to have drawn the organ when it was not wholly extended. As I observed it, the extended cirrus consists of two parts distinctly different in shape: the basal, thick and armed part and the distal part, thin, unarmed, showing the presence at its end of a bulbous swelling with a tongue-like, thin process (only rarely seen). The basal part carrying thick spines pointing backwards has a diameter of 18 to 22 μ at the bottom, enlarges further on and is 30 to 34 μ in diameter, then to taper brusquely (gradually according to Mayhew) and pass into a bare distal part 7 to 9 μ in diameter. The diameter of the terminal swelling of the bare distal part amounts to 12 to 13 μ. The length of the basal part amounts about to 70 (70) μ, that of the distal part about 130 μ (about 100 μ judging from the drawing by Mayhew). A more gradual passing of the armed part into the unarmed one can be seen in a cirrus not fully extended. The cirrus sac of slight musculature has an undulatory course in the young genital proglottids (Fig. 46) and reaches beyond the antiporal excretory canals crossing them from the dorsal side, while in the uterine proglottids it does not reach the central line of the proglottid. Most of the interior of the cirrus sac is occupied by the internal seminal vesicle. The external seminal vesicle well-developed, pear-shaped, bends in the young genital proglottids on to the dorsal side of the cirrus sac, lying on its prolongation near the central line of the proglottid in the uterine proglottids (Fig. 48 & 49). Two spherical testes situated in the back part of the central area of the proglottid reach no such great size as given by Mayhew in proportion to the length of the proglottid but their absolute size is identical with what Mayhew observed, i.e. 90 to 120 μ in diameter (the comparison taken from a drawing with a scale supplied by the author of the species in question).

Female genital system. The copulatory part of the vagina is of strong musculature, lying ventral to the cirrus sac, somewhat longer and wider than the armed basal part of the cirrus when the muscles are lax. In his drawings, made from total preparations M a y h e w



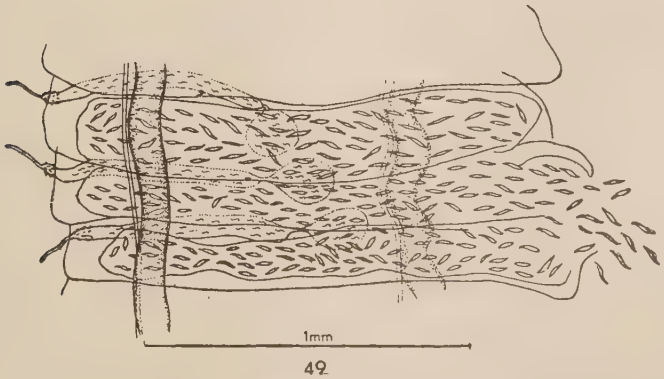


Fig. 48 and 49. *Diorchis (N.?) spinata* M a y h e w, 1929. 48. 'Male' genital proglottid with anlage of female glands, testes mature. 49. Mature uterine proglottids.

does not indicate any vagina at all, nor does he describe one in the text. The drawing of a transverse section however shows a thick-walled muscular copulatory part of the vagina, yet with a considerably narrower lumen than follows from my observation. The

copulatory part of the vagina seems however to be flattened out dorso-ventrally, hence its larger width when it is viewed in profile in a total preparation. The intermediate part of the vagina enlarges into a large oval seminal receptacle still before its course crosses the poral excretory canals. The irregularly lobate ovary extends, when it reaches its maximum growth, from the poral to the antiporal excretory canals. The vitelline gland compact, irregularly oval lies on the central line of the body of the tapeworm, ventrally to the ovary. When mature the sacciform uterus fills up almost the whole of the proglottid, does not reach the poral margin and lies dorsal to the poral longitudinal excretory canals and ventral to the antiporal ones (Fig. 49). Eggs, first oval, then lemon-shaped, and finally spindle-like when mature (this is probably due to their being fixed in Canada Balsam), 62 to 75 μ long (69 to 94 μ) and 12 to 15 μ thick (12 to 16 μ). Internal shell of egg 47 to 55 μ long (40 to 53 μ) and 9 to 11 μ thick (8 μ). Oncosphere 30 to 34 μ long (22 to 29 μ) and 7,5 to 9 μ thick (about 8 μ) (Fig. 47). Eggs get outside through a crevice opening in the antiporal margin of the uterine proglottids (Fig. 49).

The structure of the excretory system agrees with Mayhew's observations.

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Tribus *Hymenolepaea* Skrjabin et Mathevossian 1941

Dicranotaenia coronula (Dujardin, 1845) Railliet, 1892.

Synonyms: *Taenia coronula* Dujardin, 1845; *Diplacanthus (Lepidotrias) coronula* Cohn, 1899; *Dicranotaenia coronula* Railliet, 1892; *Hymenolepis coronula* Railliet, 1899, Fuhrmann, 1932; *Drepanidotaenia coronula* Parona, 1899; *Hymenolepis (Drepanidotaenia) coronula* Cohn, 1901; *Hymenolepis megalhystera* Linstow, 1905; *Weinlandia coronula* Mayhew, 1925; *Weinlandia macrostrobilodes* Mayhew, 1925; *Weinlandia introversa* Mayhew, 1925; *Dicranotaenia mergi* (Yamaguti, 1940) Skrjabin et Mathevossian, 1945; *Hymenolepis apcaris* Sharma, 1943; *Hymenolepis parvisaccata* Shepard, 1943; *Dicranotaenia coronula micracantha* Skrjabin et Mathevosian, 1945; *Dicranotaenia pseudocoronula* Skrjabin et Mathevossian, 1945.

Hosts: *Anas platyrhynchos* (L.), *Anas platyrhynchos dom. (L.), Anas poecilorhyncha* F., *Anas rubripes* Brewser, *Anser anser*

(L.), *Anser anser dom.* (L.), *Aythya marila nearctica* Stejneger, *Clangula hyemalis* (L.), *Dafila acuta* (L.), *Dendrocygna javanica* (Hors.), *Dendronessa galericulata, Fuligula fuligula* (L.), *Fuligula marila* (L.), *Glaucionetta clangula* (L.), *Mereca penelope* (L.), *Melanitta fusca* (L.), *Mergus merganser* L., *Mergus serrator* L., *Nettion crecca* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), *Oxyura leucocephala* (Scop.), *Pelionetta perspicillata* (L.), *Querquedula querquedula* (L.), *Tadorna tadorna* (L.).

Frequency and time of occurence as observed by the present author: in twenty-three *Anas platyrchynchos* (L.) out of the 77 examined (29.8 %) one to 71 specimens were found in one host at Drużno Lake and in the Districts of Białystok and Warsaw in May, July, August, September and November. In fourteen *Anas platyrhynchos dom.* (L.) out of the one hundred examined (14%) one to 183 specimens were found in one host in the Districts of Lublin, Bydgoszcz and Gdańsk, March through November. In four *Anser anser dom.* (new host) out of the 230 examined (1.7 %) one to 25 specimens were found in one host of the Lublin District in May, August and December. In a single *Fuligula fuligula* (L.) examined I found twelve specimens at Drużno Lake in November. In one *Nyroca ferina* (L.) out of the six examined (16.6 %) I found four specimens at Drużno Lake in August. In six *Nyroca rufa* (L.) (new host) out of the 23 examined (26 %) one to three hundred specimens I found at Drużno Lake in September. In one *Querquedula querquedula* (L.) (new host) out of the fourteen examined (7.1 %) I found eleven specimens at Drużno Lake in September.

Geographical distribution: Europe, America (Illinois, Alaska), Asia (India, Syberia, Japan, Nepal), Africa.

Localization: Small intestine, ceca.

Morphology: I present my own findings on the structure of the testes and the cirrus sac in the chapter „On Variability".

The variation of the shape of the testes and of their location (Types I and VII) are shown in Fig. 51, 52 and 53 and the most frequent physiological variation of the shape of the testes in the typical location (Fig. 56) are sketched from the same specimen. The fully extended cirrus forms a bulbous enlargement in its central portion. The basal part of the cirrus is 10 to 16 μ in diameter, the central one 30 to 40 μ, the basal one 20 to 28 μ, while its length amounts to 85 to 109 μ. The whole surface of the cirrus is covered with tiny bristle

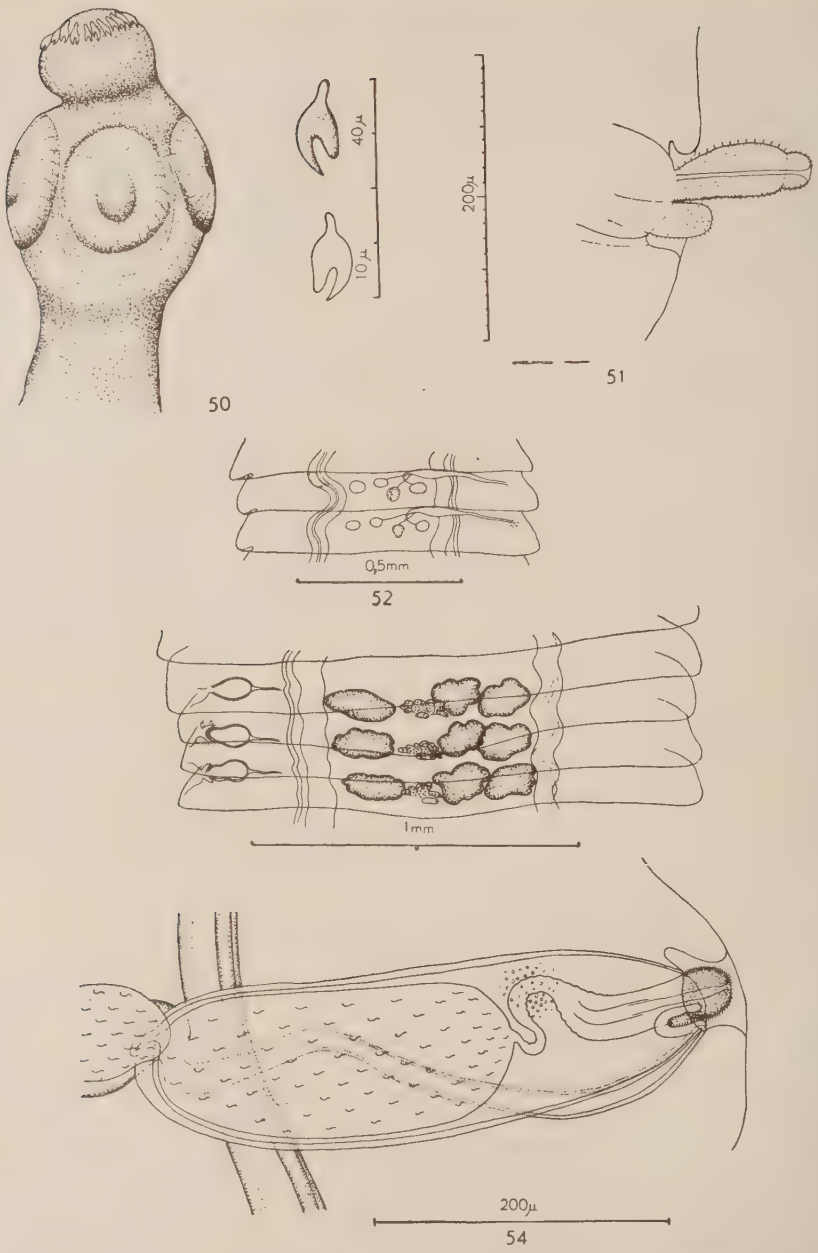
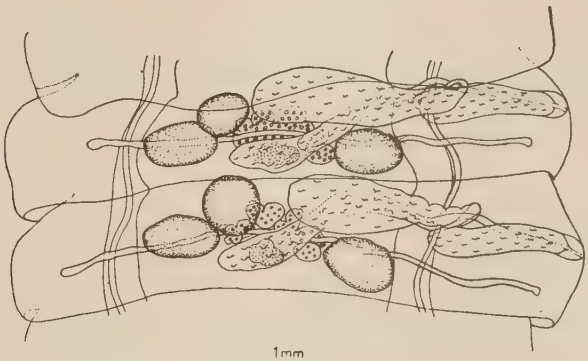
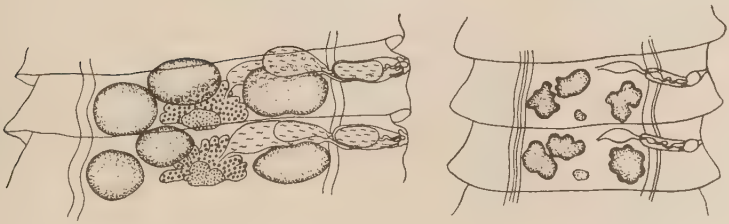


Fig. 50—54. *Dicranotaenia coronula* (Dujardin, 1845). 50. Scolex with extruded rostellum. Next rostellar hooks. 51. Genital atrium with extended cirrus and internal accessory sac. 52. Young genital proglottids with immature genital glands. 53. Hermaphrodite genital proglottids. Testes with incisions on the surface. Type VII of location of testes. Cirrus sac immature. 54. Cirrus sac with retracted internal accessory sac and partly extended cirrus.

which wear off easily and can hardly be seen when the organ is invaginated. The extrusive internal accessory sac located right by the cirrus is armed with tiny bristle very much like the armature of the cirrus (Fig. 51 & 54). The external seminal vesicle sometimes reaches a large size and goes beyond the central line of the proglottid. The seminal receptacle reaches a maximum width over the



55.



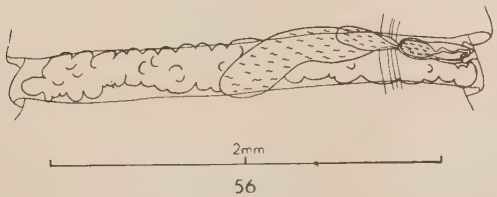


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Fig. 55. and 56. *Dicranotaenia coronula* (D u j a r d i n, 1845). 55. Fully mature hermaphrodite genital proglottids with tubular uterus. Type I of location of testes. Fig. 52, 53 and 55 drawn from same specimen. 56. Young, mature, uterine proglottids respectively with typical, most frequent location of glands.

Figures concerning anatomical details of species described as different from

No		*Dicranotaenia coronula* (Duj., 1845)	*Dicranotaenia coronula* (Duj., 1845) own investigation	*Dicranotaenia coronula micracantha* Skrj. et Math., 1945
1	Longitudo	120—190 mm	110—235 mm	
2	Latitudo	2,5—3 mm	1,3—3,9 mm	
3	Positio atrii genitalis		1/2 marginis lat.	
4	Scolex	187—220 μ Ø	130—208 μ Ø	
5	Rostellum longitudo et	80—91 μ Ø	70—90 μ Ø × ×53—65 μ	
6	Quantum, longitudo et typus uncinulorum	20—26 12,8—17,6 μ coronulus	18—24 15—20 μ coronulus	24 9—11 μ coronulus
7	Acetabula	65—74 μ Ø	55—92 μ Ø	
8	Cirrus	armatus 60—110 μ × ×30—53 μ	armatus 85—129 × ×30—40 μ	
9	Bursa cirri	258—300 μ × ×70—80 μ	303—597 μ × ×90—166 μ	
10	Sacculus accessorius	internus 33—36×11—14 μ	int. 35×26 μ invagin. 40× 25 μ evagin.	
11	Testes	I	I (VII) 80—210 μ Ø	VII
12	Receptaculum seminis			
13	Ovarium		210—305× 130—150 μ	
14	Gl. vitellina		60—90× 100—180 μ	
15	Uterus	sacciformis	sacciformis	
16	Ovum		24—35× 22—32 μ	
17	Oncosphaera	?	19—26× 15—19 μ	
18	Uncinuli embryon.	8 μ	9 μ	
19	Localisatio	intestinum tenue, caeca	intestinum tenue, caeca	

Table III

Dicranotaenia coronula (Duj., 1845) and results of own investigations

Dicranotaenia pseudocoronula Skrj. et Math., 1945	*Hymenolepis apcaris* Sharma, 1943	*Hymenolepis mergi* Yamaguti, 1940	*Hymenolepis parvisaccata* Shepard, 1943	*Weinlandia introversa* Mayhew, 1925	*Weinlandia macrostrobilodes* Mayhew, 1925
52—80 mm	70—100 mm	140 mm	110 mm	50—80 mm	150 mm
2 mm	1,1 mm	2,5—4 mm 1/2 marg. lat.	2,8 mm	1,5—2 mm ant. 1/2 marg. lat.	2—2,5 mm 1/2 marg. lat.
175 μ Ø	157 μ Ø	170 μ Ø	141—157 μ Ø	200 μ Ø	100—125 μ Ø
75 μ Ø				70 μ Ø× ×50 μ	50 μ Ø× ×60 μ
22	21—22	18	14—17	20	20—21
20 μ coronulus	16—18 μ coronulus	13—15 μ coronulus	11 μ coronulus	17—20 μ coronulus	15—16 μ coronulus
81—90 μ Ø non armatus	76 μ Ø	45 μ Ø armatus	44—46 μ Ø armatus	80 μ Ø	70 μ Ø armatus
310 μ×53 μ internus	410 μ×40 μ	350—520 μ× ×84—100 μ internus	308—351 μ× ×94—102 μ internus		300 μ
25 μ		24—30 μ× 6—10 μ	35,2×23,5 μ (evaginatus)		
I 175—225 μ Ø	V 157 μ Ø	I 240 μ	I 180—205× 154—168 μ	I	I
70—75 μ	sacciformis 20 μ Ø	70—140× 150—260 μ sacciformis 30—40 μ Ø	41—55× 94—103 μ		23—30 × 17—28 μ
	?	18—24× 18—21 μ			17—25 × 10—16 μ
8 μ	9 μ	intestinum tenue	intestinum tenue	intestinum	9 μ intestinum

vitelline gland (Fig. 55). The young, tubular, thin-walled uterus runs transversally half way through the length of the proglottid dorsal to the female genital glands and ventral to the testes. The uterus crosses the longitudinal excretory canals from the dorsal side. The figures concerning some more important features of *Dicr. coronula* are presented in Table III. This table shows more important figures concerning one subspecies and six species of tapeworms compared with my own figures to indicate that there is no foundation to consider these parasites as separate species and that they should be considered as synonyms of *Dicr. coronula*. It call for some explanation. Ad 1 and 2: The differences in the length and width of the strobila of the „species" mentioned in the table rank among the most variable features in the tapeworms and can supply no basis of distinction. M a y h e w (1925) is in my opinion mistaken when he supposes that the size of *Weinl. macrostrobilodes* is an essential distinctive feature distinguishing this species from *Weinl. introversa*. Ad 3: The location of the genital atrium is reported to be different from the other species compared only in the description of *Weinl. introversa*. The description of this feature leaves however room for mistakes since a — the length of the margin of the proglottid is measured by some writers not from the back termination of the preceding proglottid to the termination of the velum of the proglottid examined but from the termination of the velum of the preceding proglottid to the termination of the velum of the proglottid examined; b — a contraction of the longitudinal muscles of this portion of the proglottid may cause the genital atrium to shift. Ad 4 and 5: The size of the scolex and the rostellum of the species compared vary within the limits characteristic of *Dicr. coronula*. Ad 6: The varying number of rostellar hooks is accounted for by the fact that they fall off while the parasite is still alive. This phenomenon is accompanied by an atrophy of muscles controlling the hooks fallen off and consequently it is sometimes impossible to say just how many of them have fallen off even judging from the location of the hooks observed from the parietal side. The shape of the *Dicr. coronula* hooks leaves room for mistakes both in the reproduction of their construction and their size. Just to what extent the shape and size of the hooks varies can be determined after more precise methods of investigation (micromanipulator), have been used. Ad 7: The suckers as muscular contractile formations may show great diffe-

rences in size. Ad 8: In one of the species compared the authors noticed the absence of armature in the cirrus and recognized this as a particularly important feature distinguishing *Dicr. pseudocoronula* from *Dicr. coronula*. In my material I often noticed that the armature of the cirrus was absent yet this phenomenon did not appear together with the other features enumerated by Mathevossian (1946) as characteristics of *Dicr. pseudocoronula*, e. g., the tubular shape of the cirrus sac. Ad 9: Several times however I found exactly such a shape of the cirrus sac with an armed cirrus in the same specimen at the same time. A tubular (as drawn by Mathevossian, 1945) shape of the cirrus sac I consider as due to the internal seminal vesicle being slightly filled up by semen. Out of other characteristics of *Dicr. pseudocoronula* also irrelative, as I found in my investigation, to the unarmed cirrus the size of the testes should be mentioned which varies within the extent characteristic of *D. coronula*. Ad 10: In the structure and size of the sacculus accessorius of the species compared I found no essential differences. Ad 12: In *Dicr. coronula micracantha* Type VII of the location of the testes is presumably caused by the contraction of the proglottids. Type V of the location of testes in the *Hym. apcaris* Sharma, 1943, is one of major features which could give evidence for the distinction of this species, unless, of course, some error of observation or an incidentally selected abnormal case is involved here. The oscillation in the location of the testes between Type I and Type VII I found in my material fairly frequently (Fig. 52, 53, & 55). Ad 13 to 17: It is impossible to find any differences. Ad 18 and 19: What is striking in the dimensions of eggs is their small diameter (20 μ) given by Sharma (1943) in his description of *Hym. apcaris* and the large one (30 to 40 μ) given by Yamaguti in his description of *Hym. mergi*, yet these differences seem to keep within the scale of individual variation. His laconic description of *Hym. apcaris* can be objected to on many points, be it only because Sharma (1943) confuses many anatomical details of the specimens described. Thus in Fig. 5 (page 228) by this author the vitelline gland is marked as the ovary, the ovary as the uterus, the seminal receptacle as the rostellum (!), the sacculus accessorius (the drawing is inaccurate) as the cirrus. On the other hand the absence of the external seminal vesicle from the drawing admits of the supposition that it was not distinguished from the cirrus sac because

of its location (in the prolongation of the cirrus sac) and drawn together with it as one great pouch reaching beyond the half of the proglottid.

Out of all the species compared, of which the separate character seems too little substantiated only the species *Hym. mergi* Yamaguti, 1940, was quoted by Spassky and Spasskaja (1954) as one of the representatives of the genus *Dicranotaenia*. These authors, however, do not examine whether it is a separate species and only consider *Hym. parvisaccata* Shepard, 1943 as a synonym of *Dicr. coronula*.

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Drepanidotaenia lanceolata (Bloch, 1782) Railliet, 1892

Synonyms: *Taenia lanceolata* Bloch, 1782; Goeze, 1782; *Halysis lanceolata* Zeder, 1803; *Hymenolepis lanceolata* Weinland, 1858; *Drepanidotaenia lanceolata* Railliet, 1892; *Dilepis lanceolata* Cohn, 1899[a]; *Taenia acutissima* Pallas, 1781; *Taenia anserum* Frisch, 1727 in Rudolphi, 1810; *Taenia anseris* Bloch, 1779; *Hym. (Drepanidotaenia) lanceolata* Cohn, 1901; *Drep. lanceolata* var. *lobata* Szpotańska, 1931; *Drep. lobata* (Szpotańska, 1931) Skrj. et Math., 1945; *Drep. lanceolata szpotańskaica*, Hughes, 1940.

Hosts: *Anas obscura* Gm., *Anas platyrchynchos dom.* (L.), *Anser anser* (L.), *Anser anser dom.* (L.), *Anser erythropus* (L.), *Branta bernicla* (L.), *Branta canadensis minima* (Ridgeway), *Cairina moschata* (L.), *Chenopsis atrata* Lath., *Cygnus cygnus* (L.), *Fuligula fuligula* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), *Netta*

rufina (Pall.), *Oxyura leucocephala* (Scop.), *Philacte canagica* (Sevastianoff), *Phoenicopterus antiquorum* Temm., *Colymbus* sp., *Homo sapiens*.

Frequency and time of occurence, as observed by the present author: in *Anser anser dom.* (L.) in 79 specimens out of the 230 examined (34.3 %) one to 28 specimens were found in one host all through one year. The highest percentage of geese invased by this tapeworm was recorded in summer, the lowest in winter. I found no destrobilization, presumably because it was not the object of my work to examine this phenomenon, which had been investigated by Feoktistow (1953).

Geographical distribution: Europe, Asia, Australia, Alaska. Schiller (1954) was first to find this tapeworm in North America and described a very interesting case of the perforation of the small intestine of *Philacte canagica* (Sevastionoff) caused by a mature *Drep. lanceolata* specimen.

Localization: small intestine.

Morphology: In connection with the raising of the variety *Drep. lanceolata* var. *lobata*, described by Szpotańska, to the rank of the species *Drep. lobata* by Skrjabin and Mathevossian (1945) I give a few anatomical details concerning *Drep. lanceolata* (Bloch) and suggesting that *Drep. lobata* is not a separate species. Szpotańska presents the following features which she thinks witness that the variety described is a separate species:

1. The lobate structure of the testes whose location corresponds to Type XI, i.e., the antiporal testis is partially covered by the ovary and the poral testis lies beyond the cirrus sac (partially so according to the drawing);

2. The external seminal vesicle is larger than in *Drep lanceolata* and lies before the poral and central testes, while in *Drep. lanceolata* it is located between the poral testis and the cirrus sac;

3. The vagina is longer and wider than in *Drep. lanceolata* and forms many loops;

4. The genital pores are located at the termination of two proglottid;

5. The Mehliss gland is large and 108 to 126 μ in diameter.

After I examined the anatomy of a hundred specimens of *Drep. lanceolata* I noticed that:

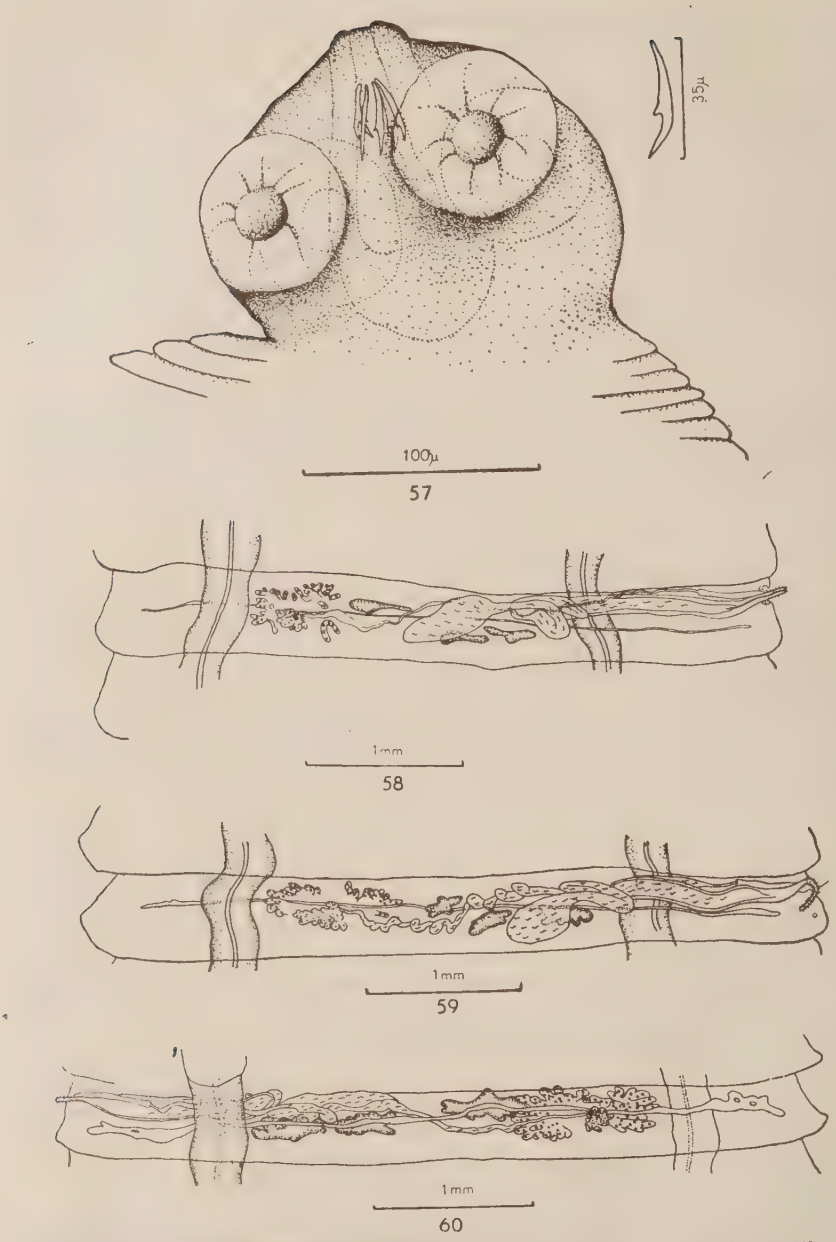

Fig. 57—60. *Drepanidotaenia lanceolata* (B l o c h, 1782). 57. Scolex with retracted rostellum. Next rostellar hook. 58. Hermaphrodite genital proglottid. Vagina with undulatory course. 59. Hermaphrodite genital proglotid. Vagina forms loops and enlarges into seminal receptacle. Testes with incisions on the sufrace. 60. Hermaphrodite genital.proglottid. Testes lobate; type XI of location. Vagina with undulatory course, forming one loop only. Uterus 'reticulated'.

1. The shape of the testes vary from typically regularly oval to deeply lobate sometimes even in the same specimen; the location of the testes in relation to the female genital glands and the cirrus sac varies and is related to the width of the proglottid: in wide forms, occuring most often, Type XII appears, while in narrow specimens a type approximate to Type XI does (See Fig. 58—61).

2. The size of the external seminal vesicle varies considerably and depends on how much of it is filled up with semen; the loops formed by the seminal duct enlarging into the external seminal vesicle are identical both in the narrow and the wide forms as well as in the drawing by Szpotańska. Despite the great differences in the width of the proglottids of every specimen the cirrus sac almost always preserves the same length varying from 1.24 to 1.72 mm while the location of the external seminal vesicle in relation to the testes varies as the width of the proglottid. The narrower the proglottid the farther the external seminal vesicle reaches in the antiporal direction.

3. The vagina has usually an undulatory course yet loops may often be observed which it forms even in wide typical specimens showing no other features similar to *Drep. lanceolata* var. *lobata*. The width of the intermediate part of the vagina which passes with no distinct break into the seminal receptacle varies widely in the same specimen. Great constance is shown only by the structure of the copulatory part of the vagina not described hitherto in any descriptions I know. The female genital pore lies usually ventral and forwards, and very seldom backwards to the cirrus sac (Fig. 61 & 62) and leads to a cylindrical, strongly muscled copulatory part of the vagina, 26 to 34 μ in diameter and 380 to 440 μ in length. The course of the copulatory part of the vagina is usually parallel with the cirrus sac. The thin-walled intermediate part of the vagina enlarges mildly, without a sharp break, into the seminal receptacle before or behind the poral longitudinal excretory canals.

4. Szpotańska's claim that the genital pores are located on the border of two proglottids is unjustified. It is denied by the author's drawing. The genital atrium is located in the front half of the right margin of the proglottid and furnished with muscles allowing it to be put outside (Fig. 62).

5. The question of the differences in the size of the Mehliss gland remains open as I have not succeeded in making any reliable observations on this point yet.

Consequently I consider *Drepanidotaenia lanceolata* var. *lobata* Szpotańska, 1931 as a synonym of *Drepanidotaenia lanceolata* (Bloch, 1782). The already known particulars of the structure of *Drep. lanceolata* should be supplemented by a more accurate description of the cirrus and the uterus of this species. Krabbe (1869) finds the cirrus to be cylindrical, armed with short bristle, 230 μ long and 38 μ wide. It follows from my observations that the cirrus of

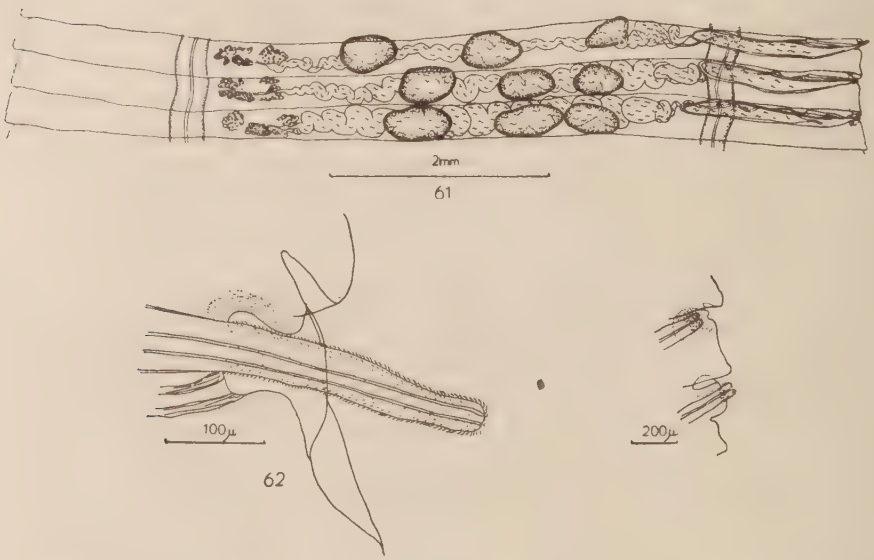

Fig. 61—62. *Drepanidotaenia lanceolata* (Bloch, 1782). 61. Hermaphrodite genital proglottid. Testes with smooth sufrace; type XII of location. Vagina enlarges into seminal receptacle and forms loop. 62. Genital atrium with partly extended cirrus and a typical location of copulatory part of vagina (behind cirrus). Next — genital atrium in usual location and shifted outside.

the tapeworm in question shows a great extensibility and that is why it is difficult to give its maximum dimensions which are sure to exceed those given by Krabbe. The shape of the cirrus is not regularly cylindrical either: its base is about 44 μ thick and it tapers mildly and gradually in the distal direction reaching about 20 μ in diameter at the top. The maximum length of the cirrus as observed by the present author amounts 420 μ. The whole surface of the cirrus is covered with fairly thick short bristle of the same length.

Fig. 62 shows the cirrus not fully extended. In a young growing uterus small eyelets appear (Fig. 60) the formation of which it is difficult to explain by the coalescence of numerous forkings of the uterus usually occuring in this species. These eyelets dissapear in further stages of the development of the bifurcating uterus. This phenomenon, although it occurs only sporadically and seems to be an exception to the rule, renders doubtful the high taxonomic value of the reticulation of the uterus ascribed to this feature by many writers. The uterus lies most often oblique to the longitudinal excretory canals, i.e., runs dorsal to the poral ducts and ventral to the antiporal ones.

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Drepanidotaenia przewalskii (Skrjabin, 1914) Skrjabin et Mathevossian, 1945

Synonyms: *Hymenolepis przewalskii* Skrjabin, 1914. *Hymenolepis tenuirostris* (Rud.) sensu Fedushin, 1937 et sensu Dubinina, 1948.

Hosts: *Anser anser* (L.), *Anser anser dom.* (L.) (recorded for the first time), *Anser albifrons* (Scop.)?, *Anser erythropus* (L.)? (according to Dubinina, 1948).

Frequency and time of occurrence (as observed by present author): In *Anser anser dom.* (L.) in 35 hosts out of the 230 examined (15,2 %) one to 159 specimens were found in one host all through the year.

Geographical distribution: Poland (neighbourhoods of Lublin, Warsaw, Toruń and Gdańsk), the USSR (South Turkestan, West Syberia).

Localization: small intestine.

Morphology: Under the name of *Drepanidotaenia przewalskii*

(Skrj., 1914) the tapeworm in question was described as a new species once only. In later works (Fedushin, 1937; Dubinina, 1948) the species was not distinguished from *Hymenolepis tenuirostris* (Rudolphi, 1819). Dubinina (1948) considers *Drep. przewalskii* as a synonym of *H. tenuirostris*. I believe that Dubinina's opinion is unfounded, for this author bases her conclusion on the comparison of a description by Lühe (1910[b]) for *Hym. tenuirostris* and that by Skrjabin (1914) for *Hym. przewalskii* and her own findings on the scolex with the rostellar hooks and the dimensions of the strobila only. Lühe's description is hardly precise and as for the external anatomy it refers only to one detail, i.e., the linear location of the three testes in the proglottid, which is a feature characteristic of *Drep. przewalskii* not of *Hym. tenuirostris* and gave rise to Dubinina's wrong conclusion. The others of Lühe's findings fully agree with the description by Skrjabin (1917[a], p. 439), which refers to *Hym. tenuirostris* and allows to stress the essential differences betweeen both species in question (the topography of the genital glands, the presence of the sacculus accessorius). Dubinina does not quote either this work by Skrjabin (1917) or the later monography by Skrjabin and Matevossian (1945). Lühe, who (1910[b]) did not go into the details of the *H. tenuirostris* anatomy appears also to have come across the later described *Drep. przewalskii* (Skrjabin, 1914) without noticing that it is a separate species. It is also likely that the only internal anatomical characteristic feature he gives for *Drep. przewalskii*, i.e., the linear location of the three testes in the proglottid, was due to an error of observation. The allegedly identical structure and size of the scolex and the rostellar hooks in both species could not, after all, offer a sufficient basis for the acceptance of the identity of *H. tenuirostris* with *Drep. przewalskii*, for entirely different species of *Hymenolepididae* with the same armature of the scolex and different internal structure have been recorded. As for the dimensions of the strobila it is generally known that they greatly vary in tapeworms. Fedushin (1937), whose work is quoted by Dubinina in her publication of 1948, appears also to respondible for her wrong conclusion. Fedushin (1937) marked a tapeworm which undoubtedly belongs to the species *Drepanidotaenia przewalskii* (Skrj., 1914) as *Hym. tenuirostris*. This is shown by a drawing by Fedushin (1937) representing young genital pro-

glottids with Type XI of location of the genital glands and the shape of the proglottids both characteristic of *Drep. przewalskii*. Fedushin (1937) also presents a few drawings of the scolex with ten hooks of the 'diorchis' type without however giving the scale of magnification. Judging from Fedushin's diagnosis these hooks correspond in their dimensions to those in *Hym. tenuirostris* and this would leave room for a supposition that the *Drep. przewalskii* scolex yet unknown, is identical with the *Hym. tenuirostris* scolex. Unfortunately it is not known for certain whether Fedushin did not deal with two species at the same time and give a drawing of the *Hym. tenuirostris* scolex and one of the proglottids belonging to *Drep. przewalskii*. The distinction of the two species in question I substantiate as follows:

I base the diagnosis of the species *Drepanidotaenia przewalskii* (Skrjabin, 1914) upon the description by Skrjabin (1914), the diagnosis of *Hym. tenuirostris* (Rud.) upon the works by Skrjabin & Mathevossian (1945) and Krabbe (1869). 1. The *Hym. tenuirostris* (Rud., 1819) testes are located in a triangle (Type III), while the *Drep. przewalskii* (Skrj., 1914) ones lie on a line; 2. There occurs an accessory sac in *H. tenuirostris*, while *Drep. przewalskii* lacks this organ; 3. The *Hym. tenuirostris* cirrus is smooth, has the shape of a blunted cone 19 μ long and 8 μ in diameter, while the *Drep. przewalskii* cirrus is strongly armed all over its surface with spines resembling thorns of the rose and has the shape of a cylinder, sligtly enlarged at its base, 106 to 122 μ long and 15 to 20 μ in maximum diameter; 4. *H. tenuirostris* eggs have the shape of a strongly elongated oval and are 85 μ long and about 20 μ thick, while *Drep. przewalskii* ones have also an oval shape yet are more like a sphere, their dimensions being 22.6 to 27 μ in length and 15.5 to 19.5 μ in thickness (as I found them).

I supplement a short description of *Drep. przewalskii* given by Skrjabin (1914) with the following remarks of my own, based on the observation of a few scores of specimens of this species. The length of fully mature specimens is difficult to determine because the tapeworms easily break into short fragments of the strobila. The loosening of the connection between the proglottids occurs at so regular intervals that the whole strobila then looks as if it consisted of a series of long and narrow proglottids with notched margins (Fig. 63). The largest mature *Drep. przewalskii* specimen

I found whole was 54 mm long and 0,68 mm in maximum width. According to Skrjabin (1914) the maximum length of immature specimens amounts 35 to 40 mm, the width 0.7 mm. Although I looked for some scolex I have not succeeded in finding any scolex which gets detached from the strobila very soon after the death of the host and probably disintegrates. The length of the proglottids without genital glands is about one ninth of their width. The genital pores are located half-way through the right margin of the proglottid.

Male genital system. The cirrus is armed all over its surface with dense spines of the same length, resembling rose thorns in their shape and pointing towards the genital atrium. The spines often fall off the distal portion of the cirrus. When fully extended the cirrus is 106 to 122 μ long. Its short basal section which passes with no sharp break into the cirrus sac is unarmed and 10 to 13 μ in diameter. In the distal direction the cirrus enlarged mildly and reaches 15 to 20 μ in diameter and then tapers gradually, its diameter continuing as far as its blunt rounded end the same at its base, i.e., 10 to 13 μ. The distal portion of the cirrus is built of delicate tissue and often gets deformed. Inside the cirrus the twisted seminal duct can be seen after it is stained with lactic acid carmine with the Blachin method (Fig. 64). The cirrus sac (Fig. 66) measures 19 to 43 μ in maximum diameter and 210 to 340 μ in length (Skrjabin makes it 220 to 250 μ in length) extends transversally in the proglottid, is of poor musculature and consists of a thinner poral portion and a thicker antiporal portion which is filled up by the internal seminal vesicle. The thin poral portion of the cirrus sac sometimes forms twists or even a loop. The external seminal vesicle, oval or spherical, may reach a diameter slightly larger than the length of the proglottid and lies antiporal to the cirrus sac or bends on to its dorsal side. Three oval or spherical testes lie linearly in the central area of the proglottid (Type XI).

Female genital system. The female genital pore lies at the bottom of the genital atrium ventral to the male genital pore and leads to the wide, strongly muscled copulatory portion of the funnel-shaped vagina (Fig. 66). The intermediate part of the vagina runs parallel to the cirrus sac and enlarges in the central area of the proglottid into an elongated seminal receptacle. The compact ovary consists of three lobes strongly connected with each other and lies

antiporal to the antiporal testis, its poral lobe often covering the antiporal testis. Two lobes of the ovary lie transversally, while the third is turned somewhat forward and in the dorsal direction. The vitelline gland is compact, bean-shaped or oval and sometimes overlaps the antiporal testis. I found no bilobate vitelline gland, nor is

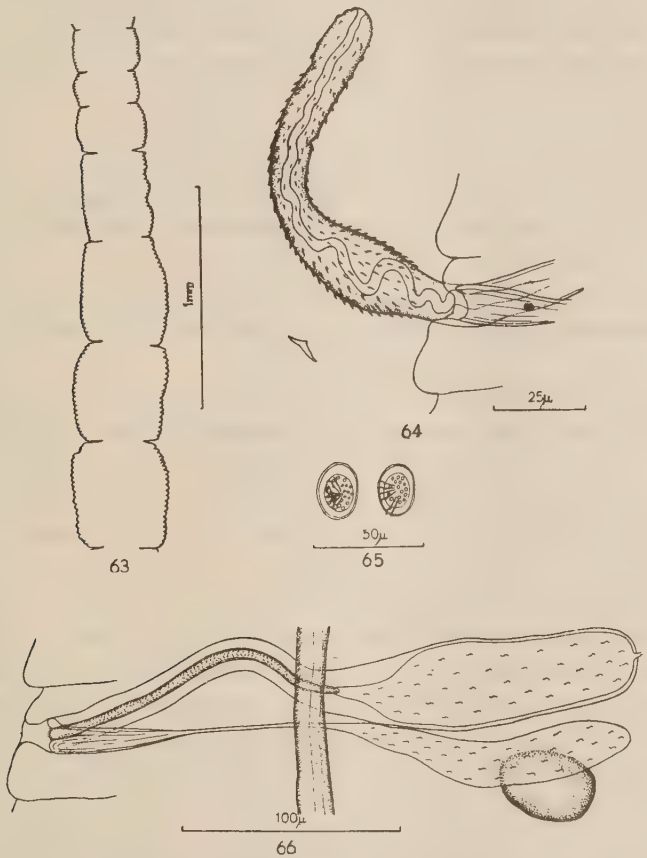

Fig. 63—66. *Drepanidotaenia przewalskii* (S k r j a b i n, 1914). 63. Outside of strobila. 64. Genital atrium with fully extended cirrus; ventral view. Next — cirrus spine. 65. Eggs. 66. Fragment of genital proglottid somewhat flattened.

it shown in a drawing by S k r j a b i n (1914 , p. 471, pl. 25, Fig. 68). A sacciform uterus fills up almost the whole of the proglottid without however reaching its poral margin. The antiporal part of the uterus develops earlier and reaches larger dimensions. The young

uterus has the shape of a wedge, its point being turned in the poral direction. Eggs (Fig. 65) slightly oval, 22.6 to 27 μ long and 15.5 to 19.5 μ thick. Three pairs of embryonic hooks of a long handle and short blade and guard.

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Echinocotyle rosseteri Blanchard, 1891

Synonyms: *Taenia lanceolata* Rosseter (nec Bloch), 1891; *Hymenolepis (Echinocotyle) rosseteri* Clerc, 1903; *Hymenolepis rosseteri* Fuhrmann, 1906.

Hosts: *Anas platyrhynchos dom.* (L.), *Spatula clypeata* (L.), *Spermaspiza haematina pustulata*, *Querquedula querquedula* (L.) (new host).

Frequency and time of occurrence, as observed by the present author: in two *Querquedula querquedula* (L.) out of the fourteen examined (14.2 %) I found 31 to 815 specimens in one host at Drużno Lake in August.

Geographical distribution: Europe (Britain, Germany, Poland), Africa (Belgian Congo).

Localization: intestine.

Morphology: Figures after Blanchard (1891) are given in brackets. I took measurements of ten specimens. The length of not quite mature specimens with uterine proglottids without well-developed oncospheres amounts, including an extruded rostellum, to 0.76 to 1.5 (1.15) mm, the maximum width 240 to 300 (180) μ. The number of proglottids varies from 18 to 28, most frequently amounting to 24 (26). The scolex (Fig. 67—68) is 110 to 126 μ in diameter (75 to 105 μ) and 105 to 118 μ long (85 to 105 μ). I measured the scolex in specimens with an extruded or partially retracted rostellum. I found no specimens with a fully retracted rostellum inside the rostellar pouch, this position changing the length-to-width relation of the scolex in favour of the diameter. By the length of the scolex I mean the distance between where the scolex passes into the collum and the basal portion of the rostellar nipple. The bottom of the rostellar pouch lies before or on the transverse line of the back

edges of the suckers. The rostellum is somewhat longer than the scolex, 150 to 160 μ long and 20 to 26 μ in diameter all through its length, except its apical part, which is somewhat enlarged to a diameter of 28 to 33 μ, and armed with a single crown of ten hooks of the 'diorchis' type 36 to 39 μ (35 to 38 μ) long (Fig. 68). A drawing of the hook given by Skrj. & Mathevossian (1945) after Blanchard (1891) shows a hook of the sucker. Longitudinally oval suckers are 45 to 55 μ in diameter of the transverse axis (27 to 32 μ) and 85 to 103 μ in diameter of the longitudinal axis (67 to 90 μ). The margins of the suckers and acetabular cavity are armed with hooks easily wearing off, 6 to 9 μ long (5 to 7 μ after Southwell and Lake), resembling rose-thorns in shape. These hooks form transverse rows along the margins of the suckers with 3 to 5 hooks in each row. The hooks fall off the area of the acetabular cavities more easily than from the margin and consequently I could observe no regularity in their arrangement deep inside the suckers (according to Blanchard, 1891, they form three longitudinal rows there). Collum 20 to 65 μ long (90 to 140 μ) and 47 to 60 μ wide (45 to 70μ). The genital atrium is shallow and lies in the front part of the right margin of proglottid.

Male genital system. When fully extended the cirrus has the shape of a cylinder with a conical terminal and is 3.7 to 4.5 μ (5 μ) in diameter and 43 to 46 μ long. Its basal part is unarmed over a score of μ while the rest of its surface, except the conical terminal, is covered with spines pointing backwards (Fig. 69). The cirrus sac, 135 to 160 μ long (140 μ) and 16 to 23 μ in maximum diameter (14 μ), is of poor musculature and reaches the central line of the proglottid or farther on in the antiporal direction. Three testes lying linearly in the proglottid are transversally oval in shape and 23 to 55 μ in maximum diameter. Dorsal and somewhat backwards to the male genital pore lies the external accessory sac, fairly strongly muscled, 10 μ thick and 30 μ long on the average. The accessory sac, extended outside, has the shape of a cylinder terminating in a hemisphere and covered with dense fine hair. The dimensions of an extended sac are 14 to 18 μ in length and 6 to 8 μ in thickness. I observed no seminal vesicles.

Female genital system. The female genital glands are slightly shifted on the antiporal side of the proglottid (Fig. 70). The bilobate ovary is transversally extended and observable only in two to three

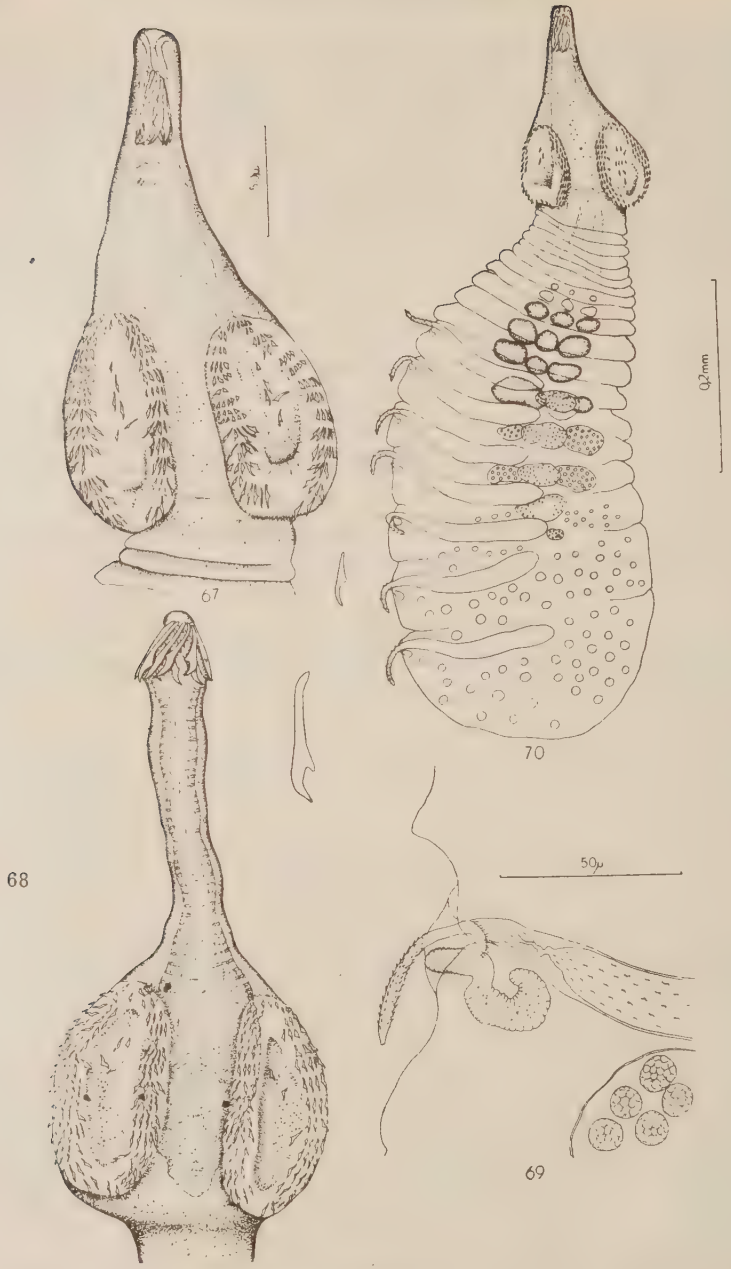

Fig. 67—70. *Echinocotyle rosseteri* Blanchard, 1891. 67. Scolex with partly extruded rostellum. Next — hook of sucker. 68. Scolex with fully extruded rostellum. Next — rostellar hook. 69. Genital atrium with extended cirrus and external accessory sac turned inside out. 70. Whole specimen.

genital proglottids. In farther proglottids it is difficult to distinguish the disappearing ovary from the devoloping uterus. The maximum size of the ovary is 100 μ in length and 24 μ in diameter. A compact, irregularly, transeversally oval vitelline gland reaches a maximum size of 48 μ in width and 23 μ in length, disappearing slightly later than the ovary. The uterus fills up almost the whole proglottid. I found no mature eggs. Blanchard (1891) believes that the uterine proglottids with well developed oncospheres tear off in this species, which makes it impossible to examine them in connection with the whole strobila.

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Hymenolepis abortiva (von Linstow, 1904) von Linstow, 1905

Synonyms: *Hymenolepis voluta* von Linstow 1904, Fuhrmann, 1924; *Taenia abortiva* v. Linstow, 1904; *Hymenolepis abortina* v. Linstow, 1905; *Hym. upsilon* Rosseter, 1911, Fuhrmann, 1924; *Weinlandia abortiva* Mayhew, 1925.

Hosts: *Anas platyrhynchos* (L.), *Fuligula fuligula* (L.), *Mergus serrator* L., *Spatula clypeata* (L.).

Frequency and time of occurrence, as observed by the present author: In six *Anas platyrhynchos* (L.) out of the 77 examined (7.8 %) I found six to thirteen specimens in one host at Drużno Lake in September and November and in the District of Białystok in October and November.

Geographical distribution: Europe (Germany, Scandinavia, Britain, France, Poland), Africa (Egypt). In Poland (Drużno Lake and the Białystok District) I found the parasite for the first time.

Localization: small intestine and ceca.

Morphology: In my material I found the length of the rostellar hooks to vary from 32,5 to 34 μ (33,8 μ; the figures in brackets being given after Skrjabin & Mathevossian, 1945). The diameter of the scolex is 165 to 220 μ (260 μ). The diameter of a partially extended rostellum is 21 to 32 μ (61 μ). Location of testes after Type VI, less frequently Type V or VII. The number of

proglottids vary from 18 to 40. Externally this species resembles *Hym. parwula* Kowalewski, 1904, yet differs distinctly from it in the shape of rostellar hooks, that of the proglottids and the horseshoe uterus (Fig. 71).

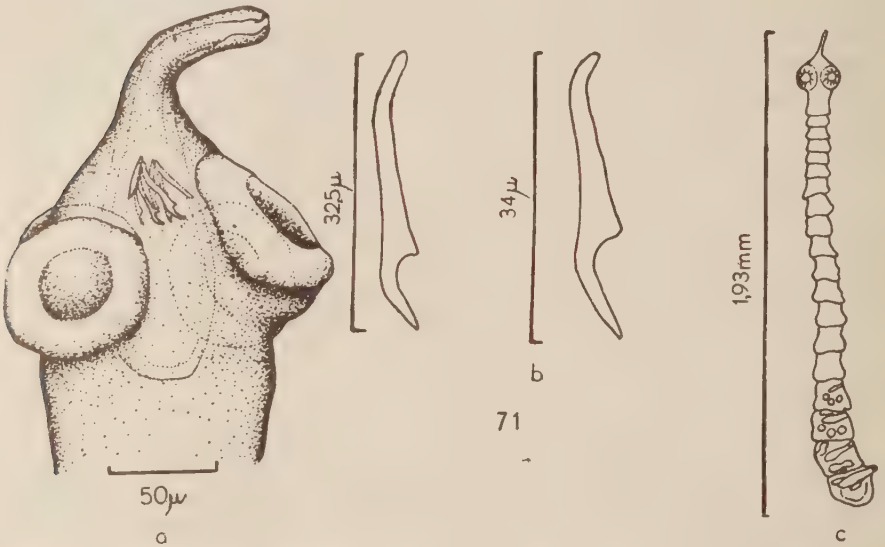

Fig. 71. *Hymenolepis abortiva* (Linstow, 1904). a) Scolex with partly extruded rostellum; b) Side view of rostellar hooks; c) Whole specimen.

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Hymenolepis anatina (Krabbe, 1869) Cohn, 1901

Synonyms: *Taenia anatina* Krabbe, 1869; *Drepanidotaenia anatina* Railliet, 1893; *Dilepis anatina* Cohn, 1899; *Dicranotaenia anatina* Wolffhügel, 1900; *Hymenolepis (Drepanidotaenia) anatina* Cohn, 1901; *Hym. anatina* Fuhrmann, 1920.

Hosts: *Anas platyrhynchos* (L.), *Anser anser* (L.), *Chaulelasmus streperus* (L.), *Cygnus olor* (L.), *Dafila acuta* (L.), *Fuligula fuligula* (L.), *Nyroca ferina* (L.), *Oidemia fusca steinegeri* Ridgeway, *Spa-*

tula clypeata (L.), *Fulica atra* (L.) (the order *Ralliformes)* and *Perdix perdix* (L.) (the order *Galliformes).*

Frequency and time of occurrence, as observed by the present author: in three *Anas platyrhynchos* (L.) out of the 77 examined (3.9 %) I found one to 125 specimens in one host at Drużno Lake in July and August.

Geopraphical distribution: Europe (France, Germany, Poland, the Soviet Union), Asia (Syberia, Japan), Africa, America.

Localization: intestine.

Morphology: The preparations coming of my collection supplied no adequate material for a comparative study since the strobilae of the tapeworms were bestrewn with numerous black-stained calcic corpuscles which made the picture of the internal structure of the proglottids obscure. The number, dimensions and type of the rostellar hooks of this species are almost identical with those in *Diorchis (D.) stefańskii* sp.n. I have described above. The only difference is in the absence of an incision on the base of the guard of the hook in. *H. anatina.* Since, besides the *D. (D.) stefańskii* sp.n. scolex differs from the *H. anatina* scolex in the presence of acetabular spines which wear off easily, these tapeworms may be confused in particular as far as young specimens are concerned. Again, the internal structure of *H. anatina* is very much like that of *Dicranotaenia coronula* Duj., 1845), as pointed out by Wolffhügel (1900 , pp. 167, 171). During the examination of a very large material, particularly incomplete (separate scolices and strobilae) mistakes may be made which seem to account for the comparatively rare occurence of the tapeworm species in question in the collections I examined, it being frequently found in older works.

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Hymenolepis arcuata Kowalewski, 1904

Synonyms: *Hymenolepis villosoides* Solowiow, 1911, Szpotańska, 1934; *Weinlandia arcuata* Mayhew, 1925; *Hispaniolepis arcuata* Lopez-

Neyra, 1942; *Hispaniolepis villosoides* Lopez-Neyra, 1942; *Microsomacanthus arcuata* Spassky et Spasskaja, 1954.

Hosts: *Aythya marila nearctica* Stejneger, *Fuligila fuligula* (L.), *Fuligula marila* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.) (new host).

Frequency and time of occurrence as observed by the present author: in the only one *Fuligula fuligula* (L.) examined I found 435 specimens at Drużno Lake in November. In two *Nyroca rufa* (L.) out the 23 examined (8.6 %) I found one to 380 specimens in one host at Drużno Lake in September.

Geographical distribution: Europe (Poland, France, Swiss), Alaska (Schiller, 1952), Kazakhstan.

Localization: intestine.

Morphology, adequately described by the discoverer of the species discussed, Kowalewski (1904), and by Szpotańska (1934), under the name of *Hym. villosoides* Solowiow, 1911. Szpotańska did not know Kowalewski's work and so she made a mistake, put right by Fuhrmann in his hypothesis that the two species are identical. Fuhrmann's opinion was published by Joyeux & Baer (1936, p. 273), who do not commit themselves to any statement on the synonyms of *Hym. arcuata* and give their diagnoses of both tapeworms as separate species. A similar stand is taken by Lopez-Neyra (1942) and Skrjabin & Mathevossian (1945). Spassky & Spasskaja (1934) share Fuhrmann's doubts, yet do not decidedly pronounce in favour of the recognition of *Hym. villosoides* as a synonym of *Hym. arcuata*, either although nowhere in their list of species classified in the new systematic arrangement does not the species name of „*villosoides*" occur. To consider both species as separate does not seem to be legitimate, for the slight differences given in the diagnosis of both forms by Skrjabin & Mathevossian (1945) are partly out of keeping with the drawings and partly lie within the extent of individual variability. Thus, we read in Skrjabin & Mathevossian's description that the *H. arcuata* testes lie in one row corresponding to Type VI (to Type VII according to Spassky & Spasskaja), while the *H. villosoides* ones form a row of Type V. Yet it follows from the drawings presented by these authors that in both cases the location of the testes corresponds to Type V. Big divergencies concern the dimensions of eggs only and this should be cheked by examining fresh eggs in water

and compare them with eggs immersed in Canada Balsam. Eggs are 60 μ in diameter according to Solowiow, 37.5 to 45 μ according to Szpotańska, and 28 to 36 μ in diameter of the longitudinal axis and 19 to 23 μ in diameter of the transverse axis according to the present author. The oncospheres are 20 μ in diameter according to Solowiow, 19 μ according to Szpotańska, 26.5 μ according to Kowalewski and 13-16 × 22-30 μ long according to the present author. The differences in the length of the embryonic hooks — 10.8 μ according to Solowiow, and 8.8 μ according to Kowalewski — lie, in my opinion, within the limits of the possible individual variability and partly within limits of the error of measurement. I found no other differences in the description of both 'species', and so I consider them as identical.

In the literature accessible to me I found no sufficient number of drawings from total preparations to get the idea of the tapeworm in question in various stages of development of the proglottids, and so I present the results of my own observation in illustrations (Fig. 72 to 79). In all specimens examined I found no cirrus which is supposed to be, according to Kowalewski, Solowiow and Szpotańska, armed with small spines. This feature is usually correlated with the structure of the copulatory part of the vagina which (Fig. 77) shows the presence of somewhat more refractive thin cuticular lining with the walls of a characteristic zigzag pattern noticeable over a few microns but only under immersion. The medial part of the vagina always runs, as I observed it, ventral to the cirrus sac and enlarges in a large seminal receptacle perfectly well preserved stil in the mature uterine proglottids. According to Szpotańska (1934) the vagina may sometimes cross the cirrus sac running from the ventral to the dorsal side, both before and behing the cirrus sac, too. I think, that this phenomenon, occurring in the uterine proglottids only, is occasioned by the growth of the uterus pressing against an enormous seminal receptacle and thus changing the topographical position of the vagina. Such a change in topography is noteworthy since the crossing of the cirrus sac by the vagina seems to be a feature occurring in all representatives of the genus *Sobolevicanthus* Spassky et Spasskaja, 1954.

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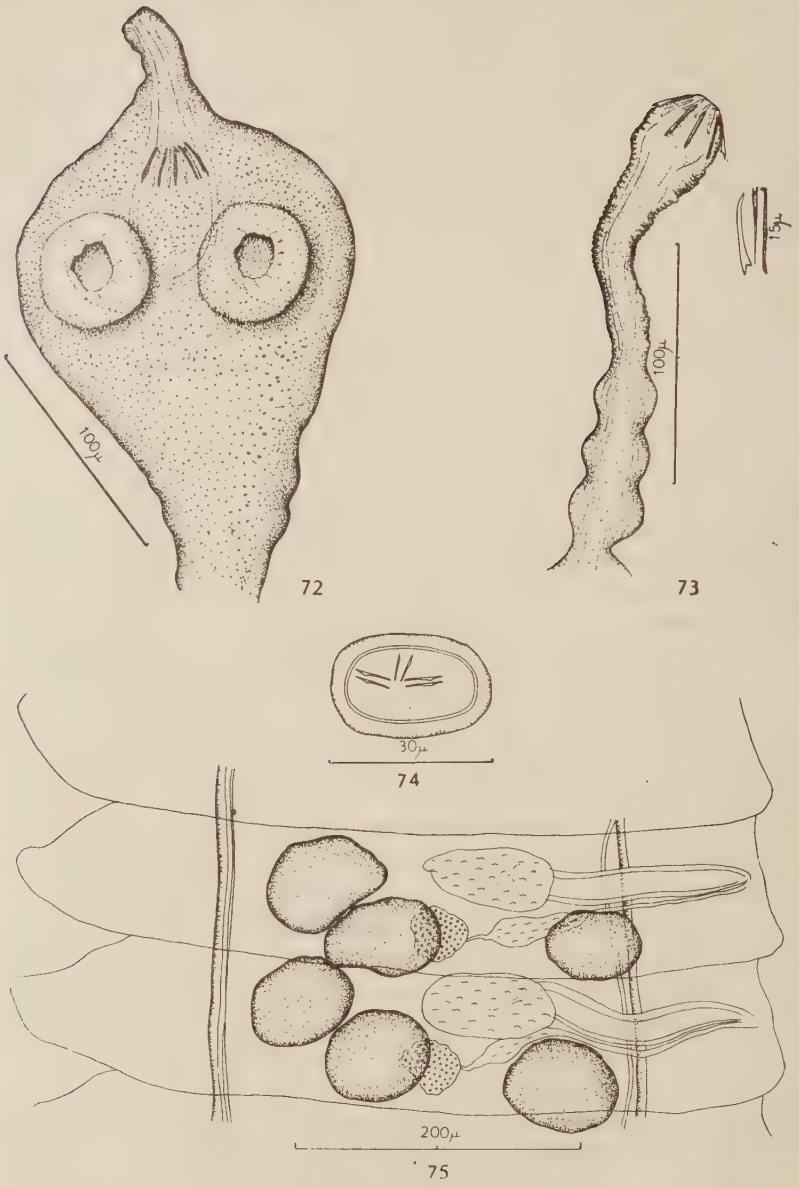
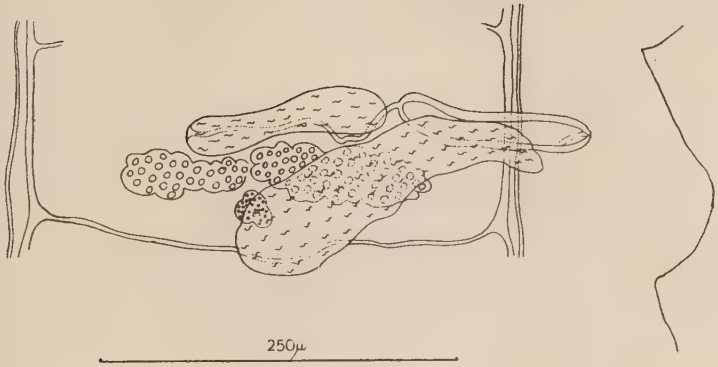


Fig. 72—75. *Hymenolepis arcuata* Kowalewski, 1904. 72. Scolex with retracted rostellum. 73. Extruded rostellum. Next—rostellar hook. 74. Egg. 75. 'Male' genital proglottids with anlage of female glands.



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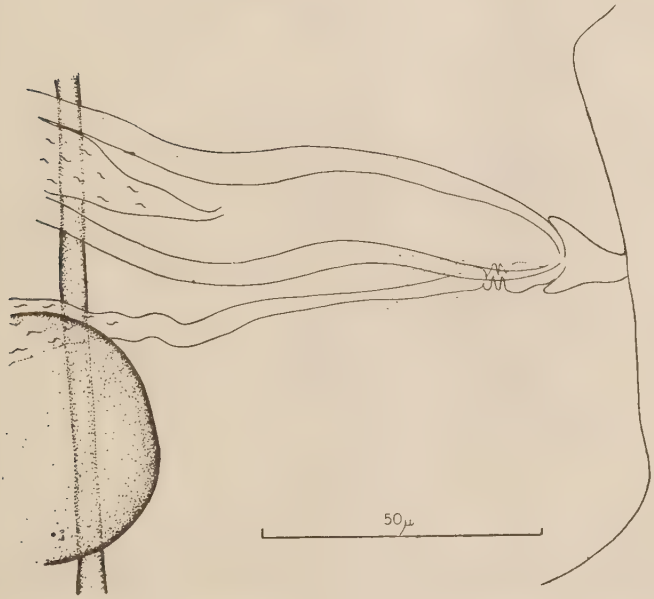

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Fig. 76 and 77. *Hymenolepis arcuata* Kowalewski, 1904. 76. Fragment of 'female' genital proglottid with transversal excretory canal. 77. Genital atrium.

1932, pp. 147, 151. 9. Szpotańska, 1934, pp. 327—332, Table LIV, Fig. 1—9. 10. Joyeux & Baer, 1936, pp. 272—274, Fig. 279, 281. 11. Lopez-Neyra, 1942. 12. Skrjabin & Mathevossian, 1945, pp. 90—92, Fig. 26, p. 226, Fig. 162. 13. Schiller, 1952, pp. 146—149. 14. Spassky & Spasskaja, 1954, pp. 83, 88.

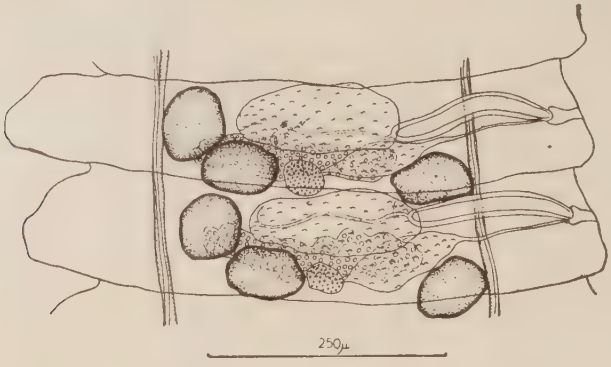

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Fig. 78 and 79. *Hymenolepis arcuata* Kowalewski, 1904. 78. Mature hermaphrodite genital proglottids. 79. Mature uterine proglottids.

Hymenolepis compressa (Linton, 1892) Kowalewski, 1904

Synonyms: *Taenia compressa* Linton, 1892; *Hymenolepis megarostellis* Solowiow, 1911; *Hym. megarostris* Gower, 1939; *Microsomacanthus compressa* L. Neyra, 1942.

Hosts: *Anas brasiliensis*, *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anas rubripes* Brewser, *Anser anser* (L.), *Ay-*

thya valisneria (Wilson), *Chaulelasmus streperus* (L.), *Dafila acuta* (L.), *Fuligula fuligula* (L.), *Fuligula marila* (L.), *Glaucionetta clangula* (L.), *Mareca penelope* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), *Oidemia nigra* (L.) and (according to Krotow, 1952, p. 260) in *Colymbus ruficollis japonicus* Hartert (*Pygopodes*).

Frequency and time of occurrence as observed by the present author: in two *Anas platyrhynchos* (L.) out of the 77 examined (2.6%) I found one to 36 specimens in one host at Drużno Lake in July and September. In one *Anas platyrhynchos dom.* (L.) (found for the first time by the present author) out of the one hundred examined (1%) I found two specimens in the Lublin District in May. In one *Fuligula fuligula* (L.) (the only one examined) I found 425 tapeworms at Drużno Lake in November. In two *Nyroca rufa* (L.) out of the 23 examined (8.6%) I found one to 371 specimens in one host at Drużno Lake in September.

Geographical distribution: North America, Europe (Poland, France, Germany, the Soviet Union), Asia (Syberia). In Poland I found it in the Lublin District and at Drużno Lake (Mazury).

Localization: small intestine.

Morphology: Kowalewski (1907) distinguishes a forma maior and a forma minor of *H. compressa* in his work. The differences between both forms are supposed to consist in different lengths (27 and 6 mm) and widths (1.1 and 0.5 mm) of the body, the number of proglottids (270 and 110) and in the appearance of the internal organs in definite proglottid behind the scolex. The number, size and shape of the rostellar hooks, the dimensions of the oncospheres and the length of the embryonic hooks were identical in both forms. Kowalewski made the division into two forms because he could find no transition forms between them. My observations wholly agree with those made by Dubinina (1953), who found a series of transition forms thus excluding the systematic distinction of the forms suggested by Kowalewski. The features enumerated by Kowalewski (unfortunately there is no information on the size of the internal organs of both forms) rank among highly variable properties. Skrjabin (1914[a]) found forms considerably larger than Kowalewski did, 40 mm long, though their strobilae were comparatively narrow (0.6 mm). The *Hym. compressa* rostellar hooks are very much like the *Hym. paracompressa* sp. n. ones in shape and size, yet they have a better developed guard, which can easily be overlooked. I think that it is due to the similarity

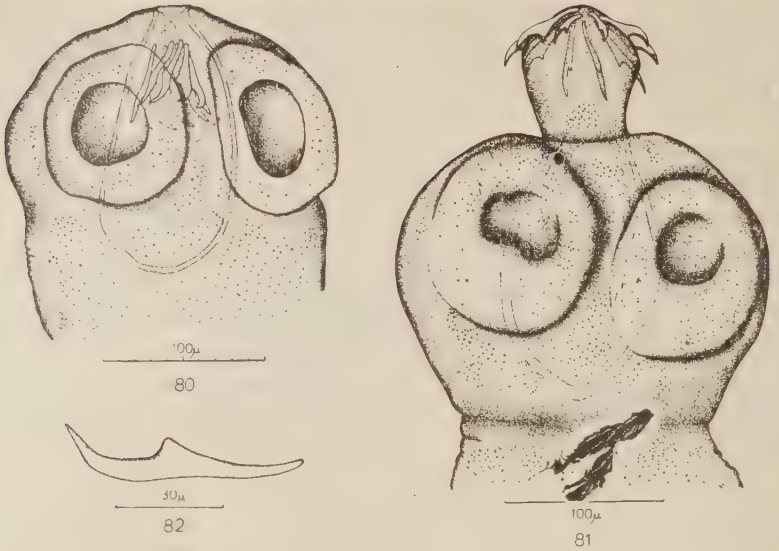

Fig. 80—82. *Hymenolepis compressa* (Linton, 1892). 80. Scolex with retracted rostellum. 81. Scolex with extruded rostellum. 82. Rostellar hook.

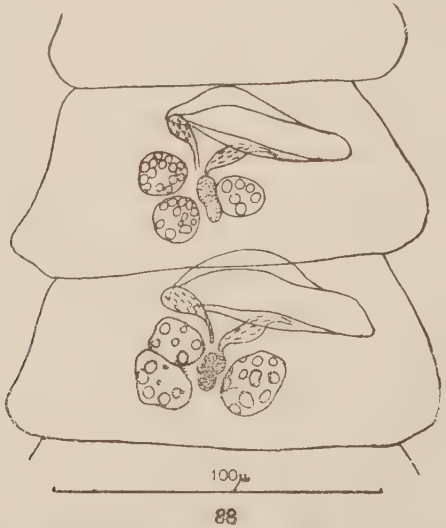

Fig. 83. *Hymenolepis compressa* (Linton, 1892). 'Male' genital proglottids with anlage of female glands. Varied location of testes. Elongated shape of immature cirrus sac.

of the hooks of both species that they have not been separated. From the drawing of two *Hym. compressa* hooks presented by Kowalewski (1907) I conclude that one of them belongs to the unidentified species *Hym. paracompressa* sp. n.

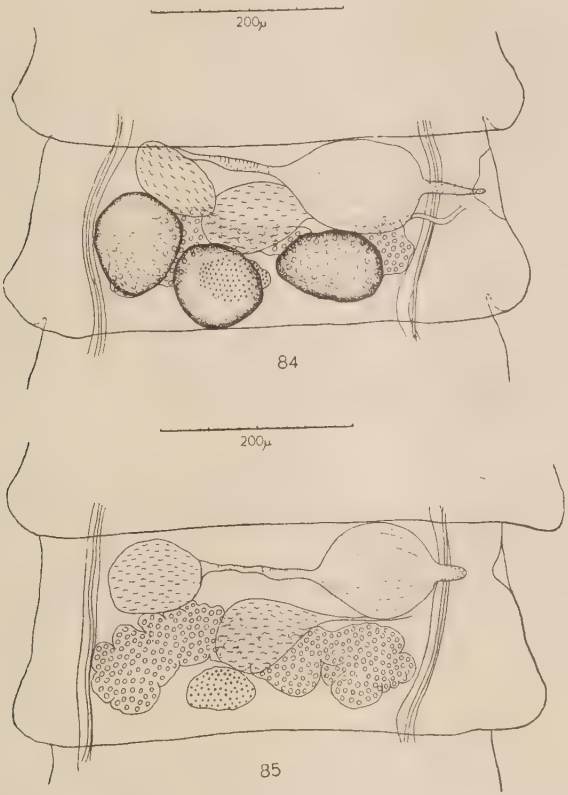

Fig. 84. and 85. *Hymenolepis compressa* (Linton, 1892). 84. Mature hermaphrodite genital proglottid with extended cirrus. 85. 'Female' genital proglottid with no testes. Cirrus partly retracted.

The following are the *Hym. compressa* anatomical features which have not yet been sufficiently described. The topographical location of the female glands roughly agrees with the description by Skrjabin (1914[a]). The linear location of three testes before the female glands as presented in the drawing by Kowalewski (1907) is presumably due to a strong flattening of the preparation. The loca-

tion of the genital glands as observed by the present author corresponds to Type V and is shown in Fig. 84. Varying locations of the genital glands often occur in the young genital proglottids: approximately corresponding to Types I and II (Fig. 83). The external seminal vesicle most frequently lies on the transverse line of the cirrus sac on its prolongation in the antiporal direction, or is bent on to the dorsal side. The seminal duct connecting both seminal vesicles is furnished with ring-like delicately marked formations presumably of muscular character (Fig. 84 & 85). An almost spherical very strong muscled cirrus sac contains in its interior the cirrus, most frequently retracted and hardly noticeable under a thick layer of muscles and that is apparently why this organ has not been described in detail so far. The extended cirrus has the shape of an elongated cone about 13 μ in diameter at the base and about 4 μ in diameter at the top. The length of the cirrus is about 65 μ. The whole of its surface is covered with scanty delicate bristle turned backwards (Fig. 84). The size of the cirrus sac in big and small forms remains almost unchanged (90 to 110 μ in diameter and 110 to 135 μ long).

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Hymenolepis paracompressa sp. n.

Hosts: *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser anser dom.* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), *Querquedula querquedula* (L.).

Frequency and time of occurrence: In *Anas platyrhynchos* (L.) in 38 hosts out of the 77 examined (49.3%) I found one to 7288 specimens in one host between April and November. In thirteen *Anas platyrhynchos dom.* (L.) out of the one hundred examined (13%) two to 224 specimens were found in one host between May and October. In six *Nyroca rufa* (L.) out of the 23 examined (26.0%) three to 380 specimens were found in one host between July and September. In one *Nyroca ferina* (L.) out of the six examined (16.6%)

four specimens were found at Drużno Lake on August 1950. In one *Querquedula querquedula* (L.) out of the fourteen examined (7.1%) sixty-two specimens were found on September 1953. In *Anser anser dom.* (L.) in one host out of the 230 examined (0.4%) four specimens were found on August 1951.

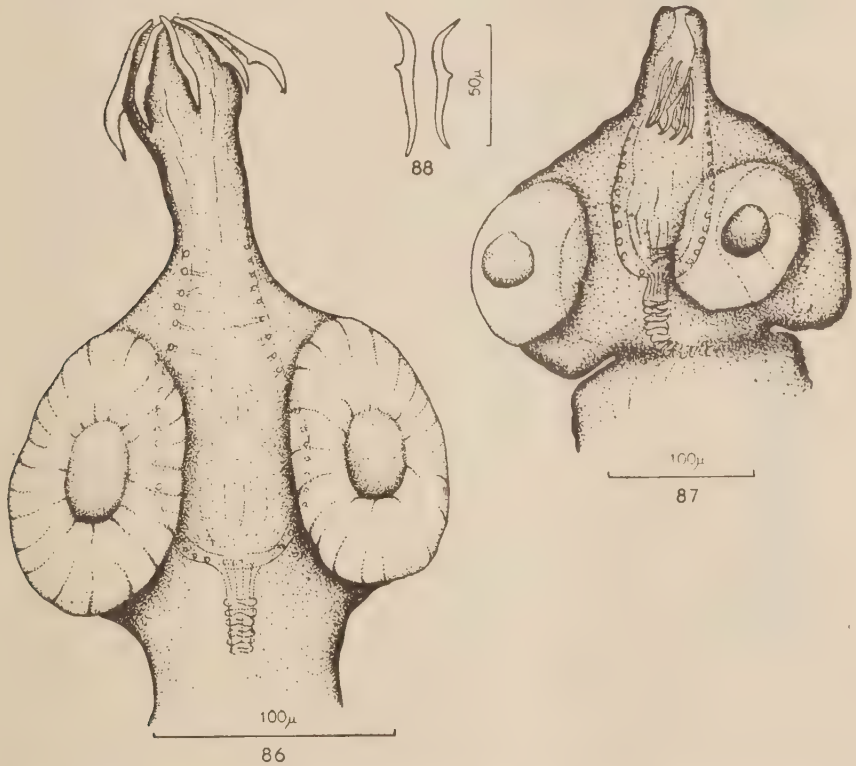


Fig. 86—88. *Hymenolepis paracompressa* sp.n. 86. Scolex with extruded rostellum. 87. Scolex with retracted rostellum. 88. Rostellar hooks.

Geographical distribution: Poland (Drużno Lake, the environs of Bydgoszcz, Warsaw and Lublin.)

Localization: small intestine.

Morphology: The whole length of mature specimens measured in a few scores of them varies from 3.6 to 37.6 mm, the maximum width from 0.55 to 1.05 mm (Fig. 89 & 90). Scolex (Fig. 86 & 87) 136 to 158 μ long and 185 to 270 μ wide. The rostellum, when fully extended, is

on the average 35 μ in minimum diameter and 105 μ long. The rostellum is armed with a single crown of 10 hooks of the 'diorchis' type 53.5 to 59.6 μ, 57.6 μ on the average (Fig. 88). The hook handle, 30 to 35 μ long, is mildly bent on to the ventral side and flattened out at the base; a small guard sticks out 2 to 3 μ from the enlargement of the handle and is vertical to the long axis of the hook; an elongated blade is 23.5 to 24.6 μ long, pointed, slightly bent on

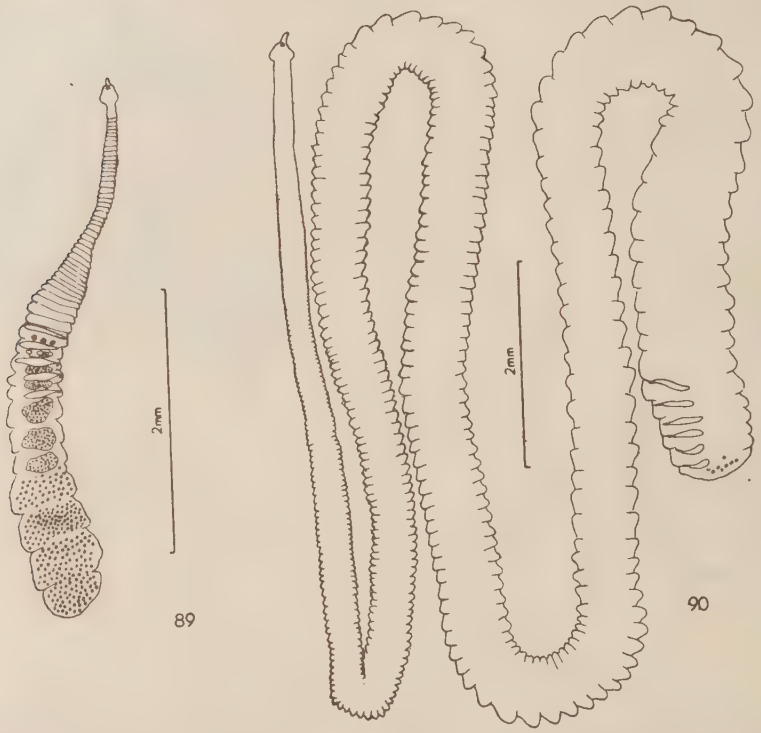
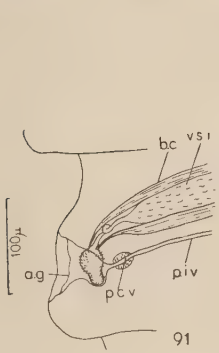
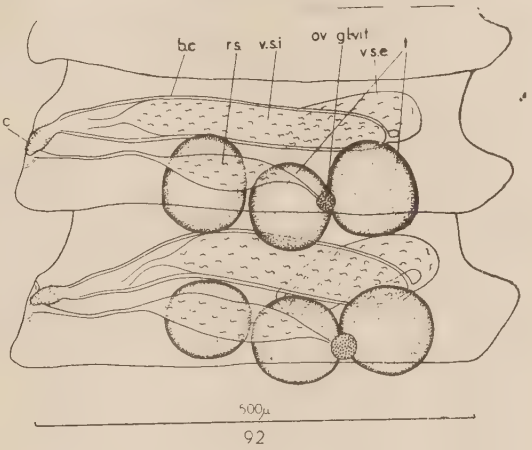


Fig. 89. and 90. *Hymenolepis paracompressa* sp.n. Outside of mature specimens largely varying in size.

to the ventral side. A muscular rostellar pouch does not reach beyond the back edges of the suckers. Suckers, oval, 65 to 90 by 110 to 120 μ, unarmed, conspicuously sticking out on the sides, muscular. Collum 76 to 80 μ wide and 72 to 84 μ long. Proglottids wide and short. The width-to-length relation in the first proglottids with no genital glands amounts to 80 to 164 by 20 to 29 μ, in the young 'male' proglottids to 365 to 408 by 70 to 93 μ, in the genital proglottids with

well-developed female glands and disappearing testes to 400 to 670 by 100 to 184 μ, in the young uterine proglottids to 550 to 1050 by 200 to 298 μ, in the uterine proglottids with well-developed oncospheres





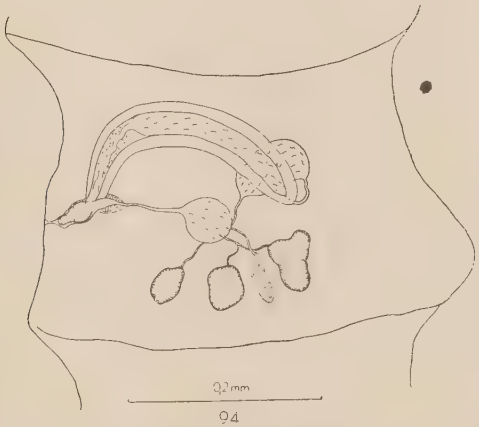


Fig. 91—94. *Hymenolepis paracompressa* sp.n. 91. Genital atrium, cirrus and vagina. 92. Young genital proglottids with large testes. 93. Varied appearance of vitelline gland in same specimen. Stained with Blachin Method. 94. Young genital proglottid, slightly stretched, with small testes.

480 to 910 by 190 to 270 μ. The total number of proglottids in a mature specimen fully varies from 58 to 346. The anlage of the cirrus sac can be seen between the 30th and 120th proglottids behind the scolex, the testes between the 40th and 160th proglottids, the female

genital glands between the 46th and 280th proglottids, the young uterus between the 50th and 310th proglottids, the mature uterus containing eggs with well-developed oncospheres between the 55th and 332th proglottids. Unilateral genital pores lie half way through the right margin of the proglottid. The genital atrium is fairly wide and narrows like a funnel in the antiporal direction if its sphincter is lax (Fig. 91).

Male genital system. The cirrus (Fig. 91) is armed all over its surface with small spines, pear-shaped, 17 to 22 μ in maximum diameter, 8 to 13 μ in minimum diameter at the tip, 31 to 37 μ long when fully extended. It is concealed deep in the genital atrium. The cirrus sac (Fig. 92, 94—97 and 99) is elongated, cylindrical, runs like an arc across the front part of the proglottid with its bend turned forward most frequently. The more or less uniform layer of well-developed musculature covers the whole cirrus sac, the thickest layer of muscles gathering in the middle of the sac when it is contracted. The dimensions of the cirrus sac when its muscles are lax amount to 235 to 275 by 55 to 67 μ in small forms and 270 to 440 by 50 to 63 μ in large forms. It is noteworthy that in small forms the cirrus sac is thicker and shorter than in large forms in which I think the width of the proglottid allows the muscles of the cirrus sac fully to relax. When fully contracted the cirrus sac reaches a thickness of 87 μ and a length of 230 μ. The antiporal part of the cirrus sac crosses the antiporal excretory canals in the young genital proglottids; in rarely found specimens with wider proglottids it reaches only beyond the central line of the proglottid. The internal seminal vesicle occupies $^1/_2$ to $^4/_5$ of the cirrus sac. The external seminal vesicle is irregularly oval or elongated and lies in the extension of the bottom of the cirrus sac in the antiporal direction or bends on to the dorsal side. Three testes, round, oval or irregular in shape are located in the back part of the proglottid forming a line or an obtuse triangle, its apex turned backwards. The diameter of the testis varies from 39 to 130 μ (Fig. 92 & 94) in large forms, most frequently 88 μ. One efferent duct leads from every testis. The efferent ducts of the central and antiporal testes joined each other forming one common duct still joined by the efferent duct of the poral testis to form the seminal duct enlarging into the external seminal vesicle (Fig. 94).

Female genital system. The vagina starts from the bottom of the

genital atrium ventral or somewhat backward to the male genital pore. The copulatory part of the vagina, enlarged, cylindrical or funnel-like over about 35 μ, is furnished with an oval sphincter

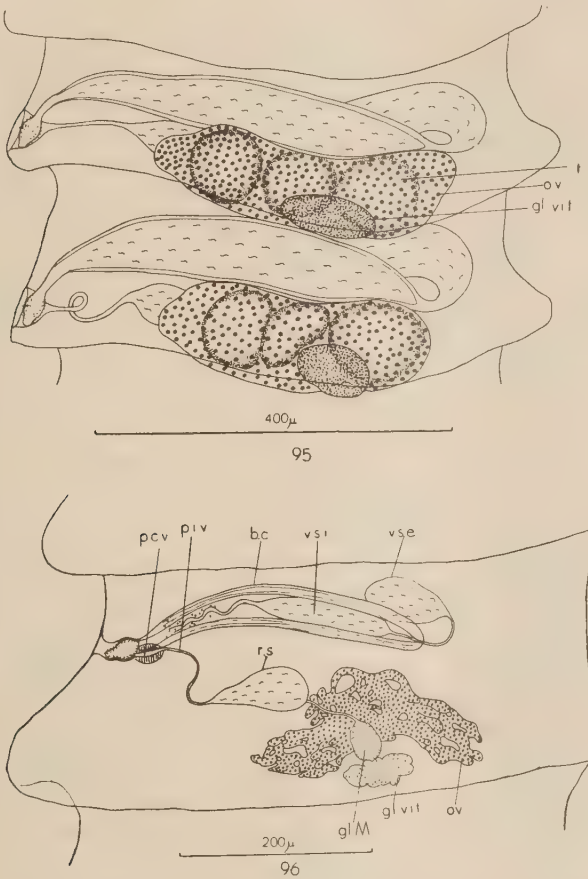


Fig. 95 and 96. *Hymenolepis paracompressa* sp.n. 95. Mature harmaphrodite genital proglottids. Compact ovary with no observable processes. Stained with boracic carmine. 96. Female' proglottid. Ovary with many processes joining each other. Stained with lactic acid carmine with Blachin method.

which narrows or widens its lumen (Fig. 91). The copulatory part of the vagina then mildly tapers and with no distinct break passes into the intermediate part (pars intermedia) which runs straight or forms few twists or, very seldom, a loop (Fig. 95). The seminal

receptacle, usually longitudinally oval, lies between the cirrus sac and the vitelline gland. The ootype is surrounded with strongly developed Mehlis gland. The vitelline gland has, at the early stages

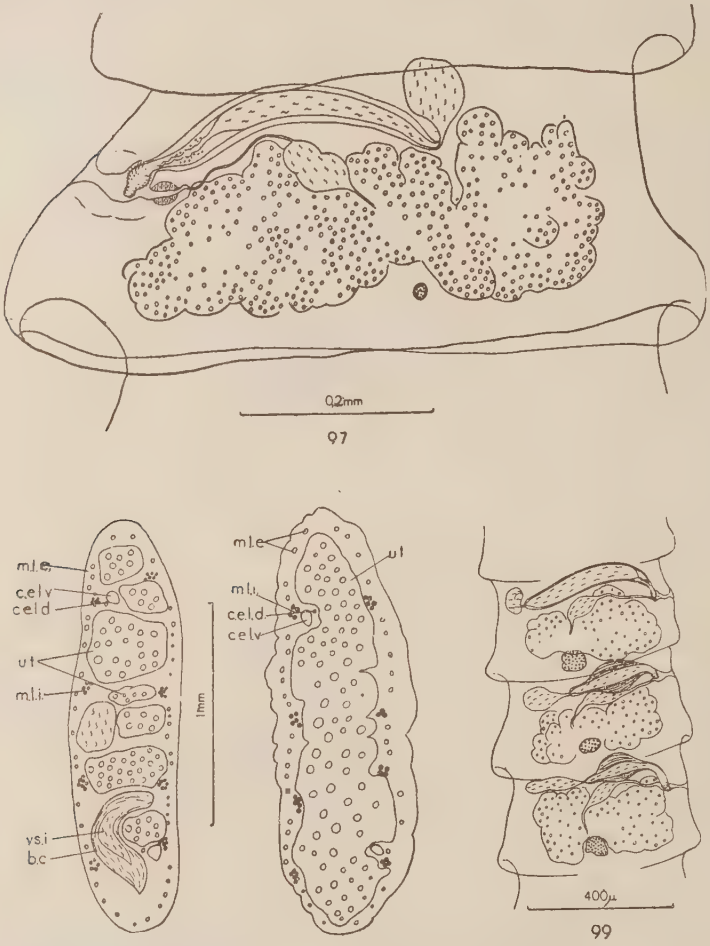


Fig. 97—99. *Hymenolepis paracompressa* sp.n. 97. Young uterine proglottid. 98. Cross-cuts of young uterine proglottid in front and central part of proglottid. 99. Varied shape of cirrus sac related to contraction of muscles.

of development, few finger-like processes which anastomose with each other to form a net. In the later stages the processes thicken, the meshes disappear and the vitelline gland looks like a formation

with a compact structure. The shape of the vitelline gland varies (Fig. 93), mostly oval or round, its maximum size amounting to 47 to 70 by 90 to 126 μ. The vitelline gland lies most often between the central and the antiporal testes (Type VIII) in the back part of the proglottid. The ovary is reticulated at first, has many anastomosing processes which gradually thicken and fuse into a campact whole with large mild diverticles (Fig. 95 and 96). The reticulated structure of the ovary shows well when the preparation is stained with the Blachin method. When fully developed the ovary forms a semi-cirle around the vitelline gland and occupies the whole central part of the proglottid. A sacciform uterus with few wide diverticle (Fig. 97 & 98) widely communicating with its lumen occupies the whole width of the proglottid. The uterus runs oblique to the excretory canals, i. e., crosses the poral longitudinal excretory canals from the ventral side and the antiporal ones from the dorsal side (Fig. 98). Eggs, with mature oncospheres, slightly oval, 25 to 29 by 33 to 36,8 μ; internal shell, 21 to 24 by 25 to 28,5 μ, oncosphere 19 to 22 by 20 to 24 μ. There are six embryonic hooks with a long handle and a shorter blade. The whole length of the hook amounts to 9,8 to 10,4 μ, that of the handle to about 6 μ.

Excretory system consists of two pairs of longitudinal excretory canals. I observed no transverse excretory canals. The dorsal longitudinal excretory canals are about 9 μ in diameter, the ventral ones three to four times as wide. The genital ducts run dorsal to the poral longitudinal excretory canals. Muscular system consists of many bundles of external longitudinal muscles lying in one layer and eight bundles of internal longitudinal ones (Fig. 98).

Differential diagnosis

1. The wide occurrence of the above described new species makes it legitimate to suppose that it has not been distinguished from *Hymenolepis compressa* (Linton, 1892), which also has ten hooks of the 'diorchis' type 55 to 58 μ long, of a very similar structure. The guard of the rostellar hook of *Hym. compressa* is somewhat bigger as judged from a drawing by Skrjabin, 1914 and not from one by Kowalewski, 1908, who seems to give a picture of a *Hym. paracompressa* sp. n. hook. *H. compressa* has an almost spherical, very strongly muscled cirrus sac of dimensions of 90 to 110 by 100 to 150 μ, a cirrus, armed with small spines, comparatively long, mildly tapering at the top (about 10 μ in maximum diameter at the base and about 65 μ long as observed by the present author;

(Fig. 84). The vitelline gland and the ovary are compact, the vitelline gland lying on the line of the central testis corresponding to Type V.

2. *Hymenolepis microsoma* (Creplin, 1829) Railliet, 1899 has (after Skrjabin & Mathevossian, 1945) hooks of the 'diorchis' type 45 to 50 μ long; an armed cirrus of a size of 160 by 10 μ after Krabbe 1869, and 84 by 21 μ after Fuhrmann, 1913; a small round vitelline gland; a massive bilobate ovary.

3. *Hymenolepis paramicrosoma* Gąsowska, 1931 has ten hooks of the 'diorchis' type of a size of 42,5 μ after Gąsowska, about 40 μ on the average as I found it; a cirrus sac strongly muscled in its central part, of average dimensions of 190 by 90 μ as I found it, 187 by 190 μ according to Gąsowska, 1931, this being probably a mistake as the information offered by the text does not agree with the drawing given by the author; the cirrus sac of. *H. paracompressa* sp. n., when its musculature is maximally contracted shows much likeness (Fig. 99, 104 & 105) both in shape and size to the *H. paramicrosoma* cirrus sac; yet the condition of this maximum contraction of the muscles occurs very seldom in *H. paracompressa* sp. n., while in *H. paramicrosoma* only a short cirrus sac is found with the greatest accumulation of muscles in its central part, which is not due to a momentary contraction but constitutes a permanent anatomical feature. The cirrus is armed, yet (as I found it) small, cylindrical, inconspicuous, of average dimensions of 30 by 5 μ.

4. *Hymenolepis rapida* Szpotańska, 1931, is a species hardly examined. Its scolex and armature unknown. It resembles *Hym. paracompressa* in the length of the cirrus sac which is, however, thicker and of a poorer musculature as it follows from the drawing; cirrus, 211 μ long an 10 μ wide.

5. *Hymenolepis oweni* Moghe, 1933, has the suckers armed with small hooks; its cirrus sac is shorter (174 by 53 μ); the diameter of the eggs is about 80 μ.

REFERENCES

1. Linton, 1892, p. 108. 2. Kowalewski, 1908, p. 775, Fig. 7—11. 3. Fuhrmann, 1913, pp. 23—24, Fig. 12—41. 4. Skrjabin, 1914[a], pp. 276—278, Fig. 1—4. 5. Gąsowska, 1931, pp. 607—610, Fig. 3, pl. 40, Fig. 10—11. 6. Szpotańska, 1931, pp. 251—252, Fig. 4 & 7. 7. Moghe, 1933, pp. 337—339, Fig. 9—12. 8. Joyeux & Baer, 1936, p. 263, Fig. 252. 9. Skrjabin & Mathevossian, 1945.

Hymenolepis paramicrosoma Gąsowska, 1931

Synonyms: *Hymenolepis (Drepanidotaenia) microsoma* Cohn, 1901, nec Creplin, 1829; *Hymenolepis microsoma* Vojtechowska-Mayerowa, 1953; *Fuhrmanniella fausti* Tseng Shen, 1932?

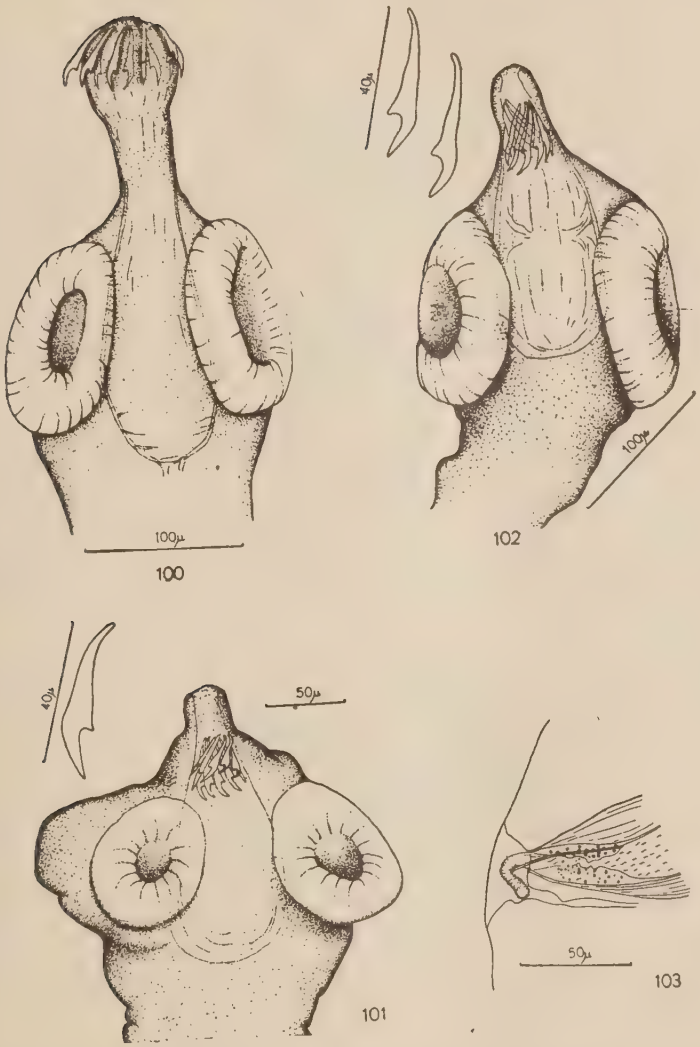


Fig. 100—103. *Hymenolepis paramicrosoma* Gąsowska, 1931. 100. Scolex with extruded rostellum. 101 & 102. Scolex with retracted rostellum, and rostellar hooks. 103. Genital atrium with cirrus and vagina.

Hosts: *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), (new host), *Fuligula fuligula* (L), *Mareca penelope* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.) (new host).

Frequency and time of occurrence, as observed by the present author: in one *Anas platyrhynchos dom.* (L.) out of the one hundred examined (1%) I found 28 specimens of this tapeworm at Skolimów near Warsaw in July. In 27 *Anas platyrhynchos* out of the 77 examined (35%) I found one to 559 specimens in one host in the District of Białystok and at Drużno Lake in July, August and September. In one *Nyroca* rufa (L.) out of the 23 examined (4.3%) I found 97 specimens of this parasite at Drużno Lake in September.

Geographical distribution: Europe (Germany, the European part of the Soviet Union, Poland, Czechoslovakia), Asia (Syberia). This tapeworm is recorded in Poland for the first time.

Localization: small intestine.

Morphology: Because of the not very accurate description of the species as offered in a work by Gąsowska (1931) and because Skrjabin & Mathevossian (1945) present by mistake a picture of *Hym. paramicrosoma* as that of *Hym. microsoma* I present below the results of my own observation made of a few hundred of specimens.

The length of fully mature specimens (very few specimens) varies from 18 to 43 mm, the maximum width from 0.8 to 0.97 mm. The scolex (Fig. 100 — 102) is 188 to 230 μ in diameter and 135 to 155 μ long. The rostellum, when partly retracted, is about 30 μ in diameter and carries ten hooks (Fig. 101 & 102) of the 'diorchis' type, 37 to 43.5 μ long. The figures of the length of the hooks of the species in question as given by Cohn, 1901 (58 μ), call in my opinion for confirmation. The shape of the hooks and their dimensions were the cause of a great confusion in the literature. The acceptance by Krabbe (1869) of a great difference in the size of the hooks of *Hym. microsoma* (Creplin) gave rise to many difficulties in determining such species as *Hym. paramicrosoma, Hym. jaegerskiöldi, Hym. abortiva, Hym. diorchis* and, presumably, *Hym. compressa* and *Hym. paracompressa* as well. It should be stressed that the *Hym. paramicrosoma* hooks have, in accordance with the drawing by the author of this species, a distinctly marked guard, owing to which the line connecting the tip of the guard with the base of the handle has two arched bends forming a kind of mild enlargement

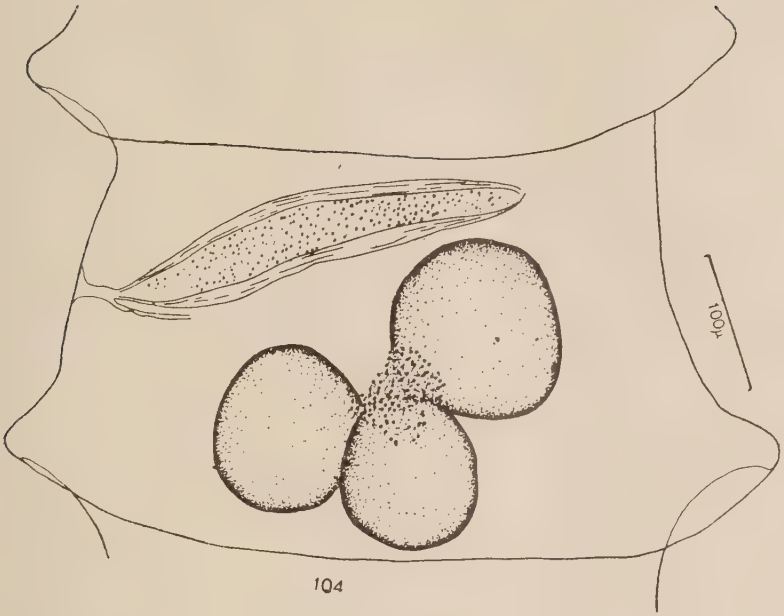


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Fig. 104 and 105. *Hymenolepis paramicrosoma* Gąsowska, 1931. 104. Young 'male' genital proglottid with elongated immature cirrus sac. 105. Hermaphrodite genital proglottid with typically shaped mature cirrus sac.

(eine kleine Ausstülpung). This enlargement is characteristic of most hooks of the 'diorchis' type, yet it is not so considerable as Skrjabin & Mathevossian (1945, p. 187, Fig. 122) mistakenly show in their picture when quoting Gąsowska (1931), whose drawing is different and gives inaccurate view of the reality. On the other hand, the line connecting the top of the guard with the base of the handle in the rostellar hooks of the tapeworm of the '*Hym. microsoma* group' (so termed by Fuhrmann in 1913), has a different course; this line runs straight from the top of the guard backwards and bends in a mild arc on the ventral side only at the base of the handle. The rostellar pouch reaches beyond the back edges of the suckers. Suckers, oval or rounded, 90 to 120 μ in diameter. The genital atrium is located half through the right margin of the proglottid. The genital ducts run dorsal to the poral longitudinal excretory canals.

Male genital system. The cirrus is usually concealed inside the cirrus sac and difficult to observe. When extended (whether fully exteded I could not see) it measures about 30 μ in length and 5 μ in diameter and is cylindrical in shape. Its surface is covered with small, very thin spines pointing backwards (Fig. 103). (The *Hym. microsoma* cirrus is considerably larger — 84 by 21 μ according to Krabbe (1869), 160 by 10 μ according to Fuhrmann (1913) —, somewhat narrower at the base and gradually enlarging like a club at the tip, all its surface being covered with short yet thick, sharp spines). When not quite ripe, the cirrus sac is elongated, almost cylindrical (Fig. 104), assuming in the farther proglottids the shape, characteristic of the species, of a cigar, very thick in the middle, 150 to 208 μ long and 72 to 102 μ in maximum diameter. The enlargement of the cirrus sac is formed of strong muscles (Fig. 105). The external seminal vesicle usually lies in the prolongation of the cirrus sac in the antiporal direction, less frequently bending downwards (as in *Hym. fausti* Tseng Shen) or on to the dorsal side. In every proglottid three spherical or somewhat oval testes of a diameter of 65 to 108 μ show a change in location from Type V to Type II. The location of the testes corresponding to Type V preponderates yet the central testis in very often shifted backwards while the others lie almost on one transverse line at the front. Such a location of the testes (Type II) is supposed to be characteristic of the species *Fuhrmanniella fausti* (*Dicranotaenia*

fausti Skrjabin et Mathevossian, 1945), discribed by Tseng Shen in 1932, the specific distinction of the species being based moreover only upon the somewhat smaller dimensions of the hooks (28.8 μ) and the strobila (2 mm long in a young specimen). The enormous similarity of the other particulars of the structure of *F. fausti* Tseng Shen gives rise to a supposition that the two forms are identical, considering, in particular, that Tseng Shen (1932) was not in a position to compare his specimens with the description of *H. paramicrosoma* as he did not know the work by Gąsowska (1931). The problem of the small dimensions of the *F. fausti* rostellar hooks goes beyond the limits of that of the individual variation characteristic of *H. paramicrosoma* and ought to receive more explanation. It follows from the text of the work by Tseng Shen (1932) that he described his new species from fragments of the tapeworm strobila, and might have measured the hooks of some other species or commited a mistake when measuring.

Female genital system. The female genital pore lies at the bottom of the funnel-shaped genital atrium ventral and somewhat backward to the male genital pore. The vagina runs transversally in the proglottid and enlarges in its central area into a large oval seminal receptacle. The bilobate ovary consists of a number of thick finger-shaped processes which at the highest phase of development of this gland merge, as it were, with each other, and occupy the whole width of the central area of the proglottid. The vitelline gland is compact and spherical, transversally or longitudinally oval, with smooth contours or incisions on its surface, 82 to 100 by 104 to 149 μ. A sacciform uterus, when fully mature, fills up the whole proglottid from the poral to the antiporal margins. Eggs, oval, 19 to 22 μ thick and 26 to 33 μ long.

Skrjabin & Mathevossian (1945, p. 171, Fig. 105) quote a picture of *Hym. paramicrosoma* after Cohn mistaking it for *Hym. microsoma* although they agree with Gąsowska's opinion that the specimens denoted by Cohn (1901) as *Hym. microsoma* belong to the species *Hym. paramicrosoma*. I believe that this picture occasioned a mistake on the part of Vojtechovska-Mayerova (1953), who denoted *Anas platyrhynchos* (L.) material as *Hym. microsoma*, unable to decide whether her specimens belonged to the species *Hym. paramicrosoma* or *Hym. microsoma*. The very

Table IV

Figures concerning anatomical details of *Hym. paramicrosoma*, *Hym. microsoma* and *Hym. fausti*

		Hym. paramicrosoma Gąsowska, 1931			*Hym. microsoma* (Creplin, 1829)		*Hym. fausti* (Tseng Shen, 1932)
		in Gąsowska, 1931	in Cohn, 1901	Czapliński	in Fuhrmann, 1913	in Krabbe, 1869	in Tseng Shen, 1932
1	Longitudo	10—15 mm (juvenis)	30 mm	18—43 mm	30—40 mm	40 mm	2 mm (juvenis)
2	Latitudo	1 mm		0,8—0.97 mm	0,7 mm	0,5 mm	0,85 mm
3	Positio atrii genit.	1/2 marg. lat.	1/2 marg. lat.	1/2 marg. lat.			
4	Scolex	224×90 μ Ø	220 μ Ø	188—230 μ Ø ×135—155 μ longit.	250 μ Ø		132×172 μ Ø
5	Rostellum			30 μ Ø (invaginatum)			20 μ Ø
6	Quantum, longitudo et typus uncinulorum	10; 42,5 μ diorchis	10; 58 μ diorchis	10; 37—43,5 μ diorchis	10; 45—50 μ diorchis	10; 35—61 μ diorchis	10; 28,8 μ diorchis
7	Acetabula		130 μ Ø	90—120 μ Ø	90—120 μ Ø		60 μ Ø
8	Cirrus			armatus 30×5 μ	armatus 160×10 μ	armatus 84×21 μ	
9	Bursa cirri	187×90 μ Ø[1])		150—208×72—102 μ	200—240 μ longit.		285×68 μ
10	Testes	„V" aut „II"	„V"	„V" aut „II" 65—108 μ Ø	„V"		„II" 148—171 μ Ø

11	Ovarium	bilobatum	bilobatum	bilobatum	bilobatum 80—100 μ latit.		bilobatum 342 μ latit.
12	Gl. vitellina			82—100×104—149 μ	30 μ Ø		91 μ Ø
13	Uterus		sacciformis	sacciformis	sacciformis		sacciformis
14	Ovum			oviforme 19—22×26—33μ			
15	Localisatio	intestinum	intestinum	intestinum tenue			
16	Habitaculum	*Anas plat.* (L.) *Fuligula fuligula* (L.)		*Anas platyrhynchos dom.* (L.) *Nyroca rufa* (L.)	*Eider molissimus* (L.)	*Eider molissimus* (L.) *Somateria spectabilis* (L.) *Fuligula marila* (L.) *Melanitta fusca* (L.) *Larus glaucus*	*Anas platyrhynchos* (L.)
17	Distributio geographica	Ukraine	Germany	Poland	Sweden	Greenland, Denmark	China

[1]) the original text makes it 187 by 190 μ; this disagrees with the authors drawing which shows that the thickness of the cirrus sac is about twice as small as its length.

comparison of the latter two species shows that the author knew neither the original work by Fuhrmann (1913) nor that by Gąsowska (1931) and consequently met found it difficult to describe her material. It is precisely because of these difficulty that the most striking essential and differences between *Hym. paramicrosoma* and *Hym. microsoma* ought of be stressed once again: 1. the shape and size of the rostellar hooks, 2. the shape of the cirrus sac thin, cylindrical in *H. microsoma* and strongly muscled and thickened in the central part in *H. paramicrosoma*, 3. the shape, size and armature of the cirrus. It seems moreover that *Hym. microsoma* is a frequent parasite of *Lariformes* and not of *Anseriformes*.

REFERENCES

1. Krabbe, 1869, pp. 296—297, Fig. 146—150. 2. Cohn, 1901, pp. 284—288, Fig. 15—22. 3. Fuhrmann, 1913, pp. 22—24, Fig. 12—14. 4. Gąsowska, 1931, pp. 607—610, Fig. 3 in text, pl. 40, Fig. 10—12. 5. Dubinina, 1953, p. 133. 6. Voytechovska-Mayerova, 1953, p. 78.

Hymenolepis parvula Kowalewski, 1904

Synonym: *Weinlandia parvula* Mayhew, 1925.

Hosts: *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), and *Nyroca rufa* (L.).

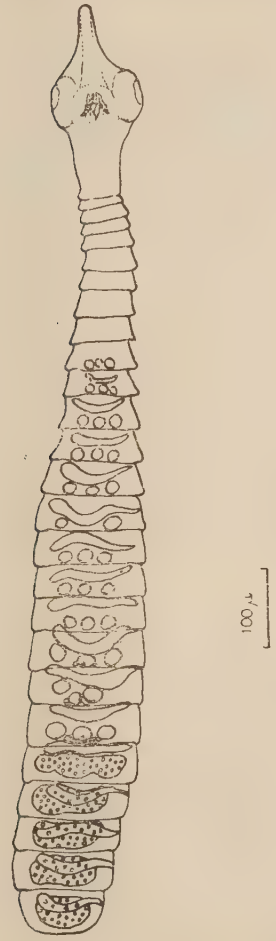
Frequency and time of occurrence, as observed by the present author: in six *Anas platyrhynchos* (L.) out of the 77 examined (7.8%) I found one to five specimens in one host at Drużno Lake and in the Districts of Białystok and Warsaw in July, August, October and November. In six *Anas platyrhynchos dom.* (L.) out of the one hundred examined (6%) I found two to 32 specimens in one host of the District of Lublin in March, May, October and November. In one *Nyroca rufa* (L.) out of the 23 examined (4.3%) I found six specimens of tapeworm at Drużno Lake on September. *Nyroca rufa* (L.) is a new host of *H. parvula*.

Geographical distribution: Europe (Germany, France, Poland, the Soviet Union, Yugoslavia).

Localization: small intestine.

Morphology was sufficiently described by Kowalewski (1904). I have some objections to the structure of the handle of the rostellar hook as drawn by Kowalewski: in the form of a club-shaped terminal enlargement. In my material I found the handle to be flattened dorso-ventrally in its terminal part (Fig. 107). It is

interesting to note that in narrow and small specimens reaching only 160 μ in maximum width and 1.4 mm in length (the last proglottids having a young well-developed uterus yet with no well-developed oncospheres) the cirrus sac preserves the same dimensions (135—155 μ in length and 20 to 26 μ in width) as in larger and wide specimens (2 mm long and 300 μ wide). The cirrus sac then reaches antiporal (left) margin of the proglottid, and in young, narrower genital proglottids it makes an arc bent forwards or backwards. (Fig. 106).



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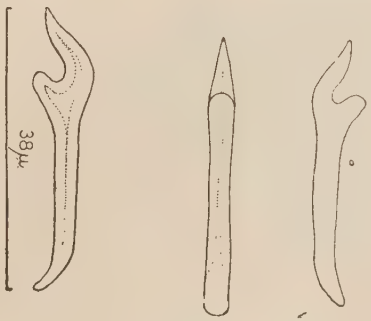

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Fig. 106—107. *Hymenolepis parvula* Kowalewski, 1904. 106. Outside of whole specimen. 107. Rostellar hooks.

REFERENCES

1. Kowalewski, 1904, p. 533, Fig. 10—17. 2. Lühe, 1910b, pp. 71—72, Fig. 50. 3. Skrjabin, 1917a, pp. 442—443, Fig. 95—98. 4 Joyeux, 1922. 5. Mayhew, 1925, p. 53. 6. Fuhrmann, 1932, p. 150. 7. Joyeux & Baer, 1936, p. 267, 508, Fig. 262. 8. Mikacic & Erlich, 1940. 9. Skrjabin & Mathevossian, 1945, pp. 186—188, Fig. 125.

Hymenolepis setigera (Frölich, 1789) Railliet, 1899

Synonyms: *Taenia setigera* Frölich, 1789; *Alyselminthus setigerus* Zeder 1800; *Halysis setigera* Zeder, 1803; *Taenia fasciata* Rudolphi, 1810 (according to Ransom, 1909); *Drepanidotaenia setigera* Railliet, 1893,

L. Neyra, 1942; *Diplacanthus (Dilepis) setigera* Cohn, 1899; *Dilepis setigera* Gower, 1939; *Hymenolepis setigera* Railliet, 1899; *Hym. (Drepanidotaenia) setigera* Cohn, 1901; *Drepanidotaenia fasciata* (Rudolphi) Railliet, 1893; *Hym. taeniata* Row, 1916; *Hym.* sp. Mikacic et Erlich, 1940; *Hym anseris* Skrjabin et Math., 1942; *Tschertkovilepis setigera* Spassky et Spasskaja, 1954.

Hosts: *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser albifrons* (Scop.), *Anser anser* (L.), *Anser anser dom.* (L.), *Anser erythropus* (L.), *Branta bernicla* (L.), *Branta leucospis* (Bechst.), *Cygnus cygnus* (L.), *Cygnus olor* (L.),*Cygnus olor dom.* (L.), *Fuligula fuligula* (L.), *Melanonyx fabalis* (Lath.), *Nyroca ferina* (L.), and also, according to Hughes (1940), *Fulica atra* (L.) of the order *Ralliformes.*

Frequency and time of occurrence, as observed by the present author: in 18 *Anser anser dom.* out of the 230 examined (7.8 %) I found one to 249 specimens in one host in April, May, July, August and December (the examination was not continued during all the months of the year). The largest invasion of the species I recorded in August.

Geographical distribution: Europe (France, Yugoslavia, Germany, Poland, the Soviet Union), Asia (India, Syberia). In Poland I found the species in the Districts of Warsaw, Bydgoszcz, Gdańsk and Lublin.

Localization: small intestine.

Morphology: *Hym. setigera* is sufficiently described on the whole. My description is limited to some little known or unknown anatomical detail. When fully extended the cirrus is cylindrical in shape and 200 to 273 μ long and 36 to 58 μ in diameter, its free end having a characteristic terminal in the shape a pierced small hood. The whole surface of the cirrus except its short basal part is covered with spines which reach the maximum length in the central part of this organ (Fig. 112). Krabbe (1869) makes the size of the cirrus 130 μ in length and 36 μ in diameter. It follows from his drawing that these are the dimensions of a not quite extended copulatory organ. This is proved by the length of the spines, the same all over the surface of the cirrus. To investigate the structure of the vagina I made a number of sections, longitudino-oblique, dorso-ventral and transverso-oblique. The female genital pore lies ventral or ventral and somewhat forward to the male one, deep in the funnel-like hollow of the genital atrium and leads to a richly muscled copulatory part of the vagina the length of which corresponds

to that of the cirrus. The copulatory part of the vagina runs parallel with the cirrus sac and shows the presence of longitudinal folds which are conspicuous in the cross-cut (Fig. 110). The thick-walled

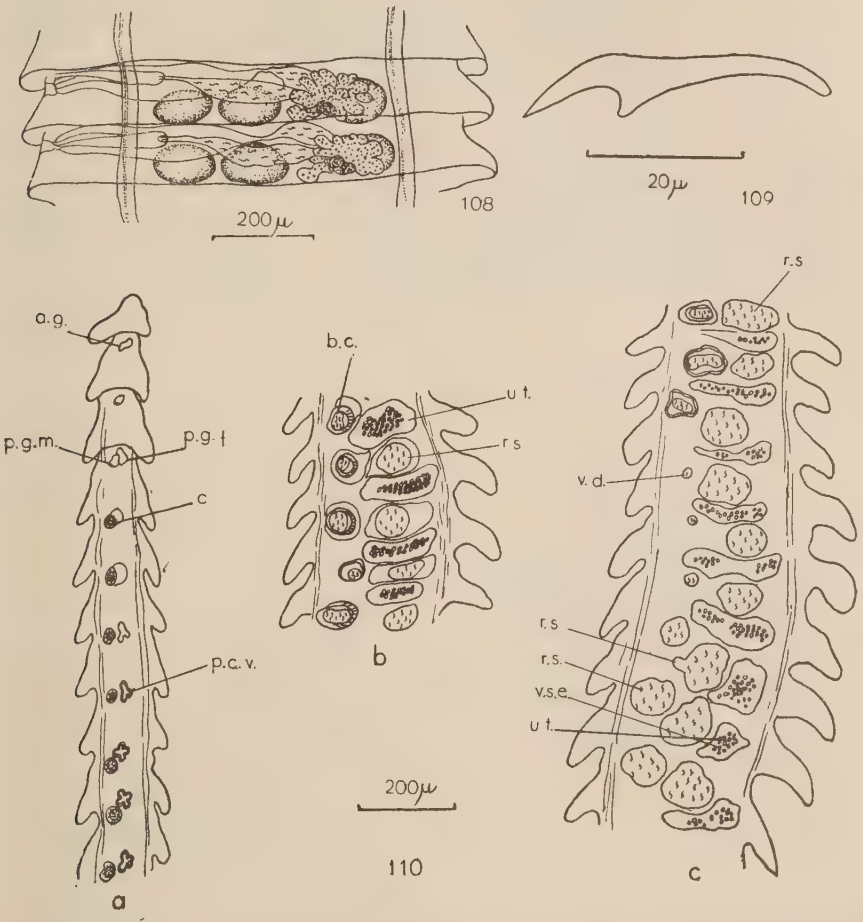
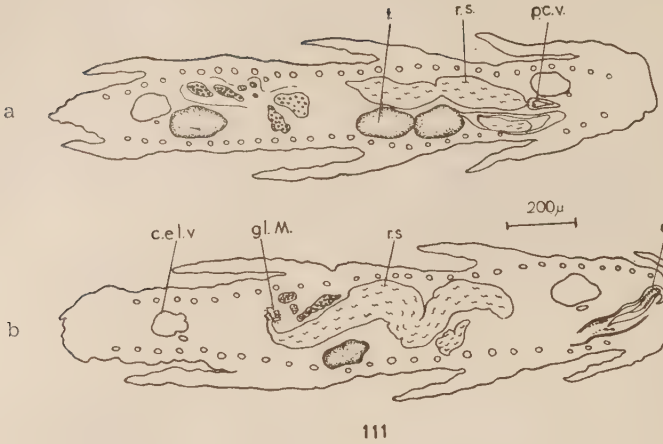


Fig. 108—110. *Hymenolepis setigera* (Frölich, 1789). 108. Hermaphrodite genital proglottid. 109. Rostellar hook. 110. Longitudinally oblique cuts of young uterine proglottids in dorso-ventral plane.

copulatory part of the vagina ends abruptly and passes into the thin-walled intermediate part soon enlarging in a large seminal receptacle (Fig. 108 & 111a). The uterus lies in the poral half of the proglottid behind the cirrus sac and the seminal receptacle and in



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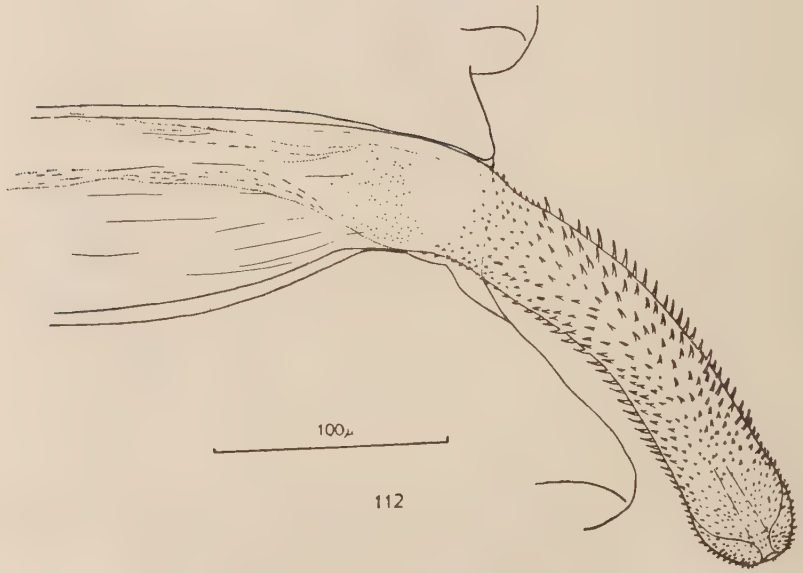

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Fig. 111 and 112. *Hymenolepis setigera* (Frölich, 1789). 111. Transversally oblique cuts across hermaphrodite genital proglottid. 112. Genital atrium with extended cirrus.

the central area of the proglottid it is pushed by the strongly growing external seminal vesicle and the seminal receptacle on to the ventral side. The names „copulatory and intermediate part of the vagina — pars copulatrix et intermedia vaginae", I took from the work by Spassky & Spasskaja (1954).

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Hymenolepis spiralibursata sp.n.

Hosts: *Anas platyrhynchos* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), *Querquedula querquedula* (L.).

Frequency and time of occurrence: In *Anas platyrhynchos* (L.) in 27 hosts out of the 77 examined (35.0 %) from one to 2539 specimens in a host in April, May, July, September and November. In *Nyroca rufa* (L.) in 17 hosts out of the 23 examined (73.9 %) from seven to 1838 specimens in one host from July to September. In *Nyroca ferina* (L.) in four hosts out of the six examined (66.6 %) from one to 79 specimens in one host in July and August. In *Querquedula querquedula* (L.) in one host out of the fourteen examined (7.1 %) two specimens found in May.

Geographical distribution: Poland (Drużno Lake, Mazury; the neighbourhood of Bydgoszcz).

Localization: small intestine.

Morphology: The entire length of mature specimens varies from 2.9 to 24 mm, the maximum width from 0.45 to 0.9 mm. Scolex (Fig. 113 & 114) 120 to 260 μ in diameter, 108 to 176 μ long. The rostellum, very extensile, elongated, 240 to 330 μ long and 23 to 34 μ in minimum diameter and 40 to 65 μ in diameter at the tip, armed with a single crown of ten hooks of the 'iorchis' type 29.5 to 33.2 μ long. The length of the pointed blade, mildly bent on to the ventral side amounts 8 to 9 μ, that of the handle, somewhat flat-

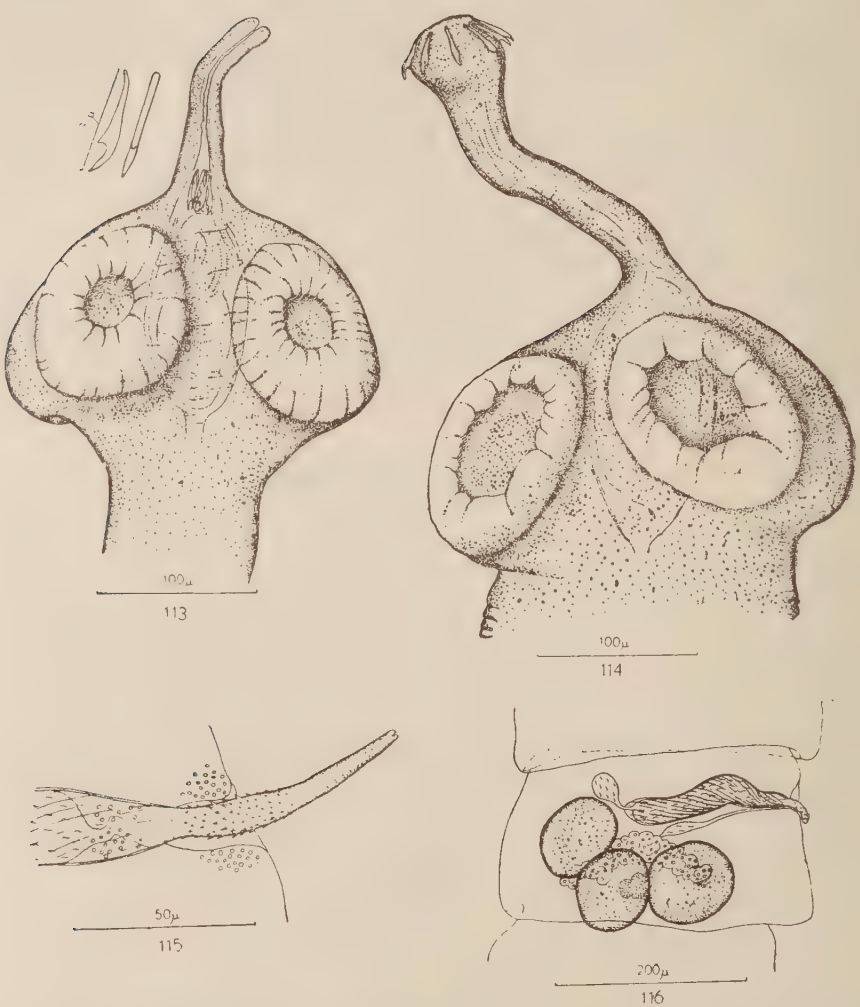

Fig. 113—116. *Hymenolepis spiralibursata* sp.n. 113. Scolex with retracted rostellum and rostellar hooks. 114. Scolex with extruded rostellum. 115. Genital atrium with extended cirrus. 116. Hermaphrodite genital proglottid with Type V of location of genital glands.

tened at the base and slightly bent, is 21.5 to 24.2 μ. The guard is about 3 μ long, and flattens at the tip transversally to the long axis of the hook (Fig. 113). Suckers large, somewhat oval, 70 to 100 by 80 to 135 μ. The rostellar pouch reaches far beyond the back edges of the suckers. Collum short, contractile, 80 to 175 μ wide and 30 to 178 μ long. The total number of proglottids of a mature specimen amounts to 80 to 140. The genital atrium lies in the front half of the right margin of the proglottid.

Male genital system. The cirrus, armed, when fully extended has the shape of a cylinder mildly enlarging at the base and slightly gradually tapering at the tip. Its length amounts to 70 to 84 μ, its maximum diameter to 9 to 13.5 μ, its minimum diameter near the tip to 3 to 4.5 μ. The armature of the cirrus consists of many hooks pointing in the antiporal direction and attached only to the basal part of the cirrus as far as about its half. These hooks are largest where the cirrus enlarges most. The apical part of the cirrus is unarmed. In contradistinction to *Hym. paracompressa* sp.n. the *Hym. spiralibursata* sp.n. cirrus is very often extended beyond the margin of the proglottid (Fig. 115). The cirrus sac crosses from the dorsal side the poral longitudinal excretory canals and is furnished with a thin but strong layer of muscles which very often show a spiral course (Fig. 116). The dimensions of the cirrus sac are: 24 to 58 μ in diameter and 150 to 318 μ in length. In small forms the bottom (the antiporal part) of the cirrus sac reaches in the young genital proglottids beyond the central line of the proglottid and occupies more than half of its width (Fig. 116). In large forms the cirrus sac crosses only the poral excretory canals and occupies only somewhat more than a quater of the width of the proglottid (Fig. 117), although the absolute dimensions of the cirrus sac in large forms may be twice as large as that in small forms (Preparation No 216 and 217). The internal seminal vesicle occupies 1/2 to 4/5 of the interior of the cirrus sac and changes its size according to how much of it is filled up with semen. The external seminal vesicle, irregularly oval, elongated or spherical lies in the prolongation of the cirrus sac in the antiporal direction or bends on to the dorsal side. The seminal duct sometimes enlarges between where the efferent vessels join each other and the external seminal vesicle to form, as it were, a third small seminal vesicle (Fig. 117). From each testis goes one efferent duct. Three oval or spherical testes lie in the central area of the proglottid forming an obtuse triangle corresponding to

a type transitory between Type V and Type VIII. The antiporal testis is shifted foremost. The dimensions of the testes greatly vary from 39 to 163 μ in diameter (Preparations No. 215 & 216).

Female genital system. The female genital pore lies ventral or somewhat backward to the male one. The vagina runs parallel with

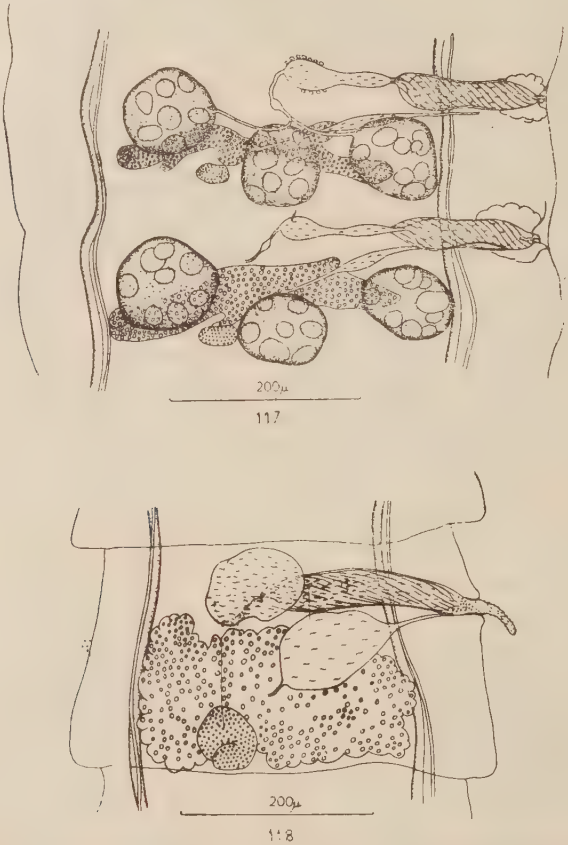

Fig. 117—118. *Hymenolepis spiralibursata* sp.n. 117. Harmaphrodite genital proglottid, somewhat flattened, with type of location of genital glands similar to type VIII. 118. 'Female' genital proglottid with ovary of maximum size.

the cirrus sac, crosses from the dorsal side the poral excretory canals and enlarges into an elongated or almost spherical seminal receptacle (Fig. 118). The vitelline gland, of a compact structure, transversally oval or almost spherical, of a maximum size of 36 to

80 by 56 to 148 μ, lies in the back part of the proglottid between the central and the antiporal testis or on the line of the central testis and ventral to it. A bilobate ovary lies transversally in the proglottid, ventral to the testes, and shows the presence of few fairly thick processes (Fig. 116 & 117) in the early stages of development. When fully mature the ovary fills up the whole of the back half of the central area of the proglottid and reaches somewhat beyond the poral and antiporal excretory canals (Fig. 118). A sacciform uterus with few wide diverticles fills up the whole of the proglottid and lies obliquely crossing the poral excretory canals from the dorsal side and the antiporal ones from the ventral side (Fig. 119.) Eggs round, 27 to 36.4 μ; oncosphere spherical, 18 to 26 μ in diameter; six embryonic hooks about 9 μ long (Fig. 120).

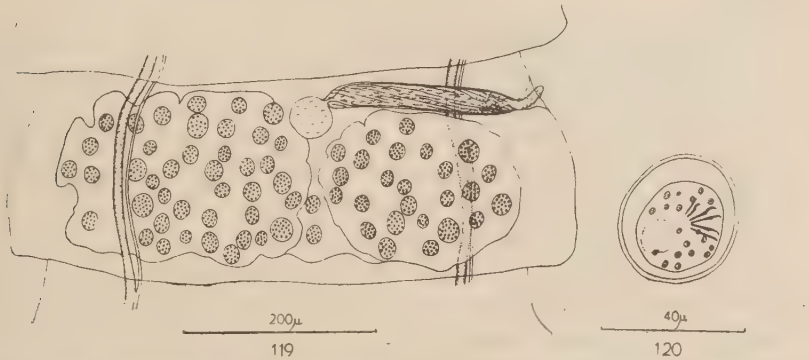

Fig. 119—120. *Hymenolepis spiralibursata* sp.n. 119. Young uterine proglottid. 120. Egg.

The excretory system consists of two pairs of longitudinal excretory canals. The ventral excretory canals are about 11 μ in diameter the dorsal ones about 3.5 μ. I found no transverse excretory canals.

The musculatory system can be seen in some total preparations (Prep. No 213) and consists of many vaguely marked external longitudinal muscles and eight bundles of internal longitudinal muscles.

Differential diagnosis

1. *Hymenolepis microsoma* (Creplin, 1829) I compare with the above described *H. spiralibursata* sp.n. because of the inconsistencies in the descriptions of this species by various authors. According to Krabbe (1869) the length of the *H. microsoma* hooks

varies from 36 to 61 μ, yet the large strongly armed cirrus of this species (Fig. 146 after Krabbe, 1869) is covered with equally large spines throughout its length, enlarges like a club and reaches a size of 21 by 84 μ. According to Fuhrmann (1913) *H. microsoma* has hooks 45 to 50 μ in length, an armed cirrus of a size of 10 by 160 μ, a massive ovary.

2. *Hymenolepis exigua* Yoshida, 1910, a parasite of *Galliformes*, has allegedly hooks of the 'diorchis' type 30 to 50 μ long (!), an almost straight blade, a thick guard pointing forwards. The cirrus is, judging from the drawing, structurally similar to *H. spiralibursata* sp.n. Differences: testes, lying linearly; female glands, behind testes; vitelline gland on the line of antiporal testis; uterus, filled up with comparatively few eggs, much larger in proportion to the size of the uterine proglottid than the *H. spiralibursata* sp.n. eggs.

3. *Hymenolepis jägerskiöldi* Fuhrmann, 1913. Hooks, 42 to 45 μ long; uterus U-letter-shaped, containing 30 to 40 eggs.

4. *Hymenolepis paramicrosoma* Gąsowska, 1931, has hooks mainly over 40 μ long, a small hardly noticeable cirrus armed all over its surface with very small spines (as I found it). Cirrus sac, strong-muscled in the central part.

5. *Hymenolepis tritesticulata* Fuhrmann, 1907, has ten hooks of the 'diorchis' type 32 μ long yet of a slightly different structure. Cirrus cylindrical, with enlargements in the middle and at the tip, armed with densely lying spines all over its surface. Sacculus accessorius present; ovary asymmetrical. Uterus, judging from the drawing, filled up with only under twenty eggs 40 to 45 μ in diameter.

6. *Hymenolepis fulicicola* Skrjabin et Mathevossian, 1942, has hooks 36 μ long with the base of the handle strongly bent on to the dorsal side. Cirrus sac pear-shaped, strong-muscled; cirrus unarmed.

7. *Hymenolepis vaginata* Baczyńska, 1914. Hooks 36 μ long, with quite a different shape: handle straight and thick, the thickness of the hook with the guard amounts, when measured in profile, to almost 1/3 of the whole length of the hook. The vitelline gland lies between the poral and the central testis. The copulatory part of the vagina forms a strong-muscled funnel.

8. *Hymenolepis longivaginata* Fuhrmann, 1906. Hooks, 35

to 44 μ long. The cirrus sac in specimens having a maximum width of 1 mm reaches the antiporal excretory canals. Testes lying linearly; vitelline gland on the line of the central testis (Type VI).

9. *Hymenolepis longirostris* (Rudolphi, 1819) Railliet, 1899. Lives in *Glareola pratincola* (L.). Hooks, 33 μ long, of the 'nitidus' type.

10. *Hymenolepis abortiva* (Linstow, 1904). The whole strobila consists of 18 to 40 proglottids (as I found it). No considerable variation in the number of proglottids of this species was observed. Uterus horseshoe-shaped with its arms directed forwards. Testes, lying linearly, their location corresponding to Type VI. The shape of the proglottids somewhat different despite the similar length of hooks (32,5 to 34 μ).

11. *Hymenolepis streptopeliae* Joyeux et Baer, 1935. Hooks 30 μ long yet of quite a different shape; handle, just as wide at its base in profile as the blade in its maximum diameter; guard conspicuous, comparatively long. Testes lying linearly. Eggs 35 by 47 μ. Lives in *Columbiformes: Streptopelia orientalis* (Lath.), *S. capicola* (Finsch et Hartl).

12. *Hymenolepis woodsholei* Fuhrmann, 1932 (Syn.: *Hym. podicipina,* Linton, 1927 nec Szymański, 1905). Lives in *Podiceps auritus* (L.) and *Podiceps griseigena holboelli* R. Hooks, with a guard thicker in profile than the blade and the handle. Testes lying linearly.

13. *Hymenolepis spinosa* Linstow, 1906. A parasite of *Charadriiformes: Rostratula capensis* (L.), *R. benghalensis*. Hooks 28 to 30 μ, structurally similar to the 'arcuatus' type. Cirrus armed at its end with small spines.

14. *Hymenolepis pellucida* Fuhrmann, 1906. Lives in *Passeriformes* in Brazil. Hooks 32 to 43 μ long, different in structure: guard thick and blunt; handle thick; blade comparatively short. Cirrus sac under-developed, small. Type III location of the genital glands. Eggs 60 μ in diameter.

15. *Hymenolepis fausti* (Tseng Shen, 1932) Fuhrmann, 1932 has a characteristic cirrus sac resembling the *Hym. paramicrosoma,* Gąsowska, 1931 cirrus sac with a strong layer of muscles in its central part. Hooks somewhat smaller, 28.8 μ long.

16. *Hymenolepis tenuirostris* (Rudolphi, 1819) has shorter hooks (only 20 to 23 μ long) and a little different shape. Type III

location of the testes. Sacculus accessorius present. Eggs elongated, 85 μ long.

17. *Hymenolepis formosa* Dubinina, 1953 has somewhat longer hooks: 34 to 38 μ; the base of the handle is furnished with a rhomboidal flat formation called 'chitinous membrane' by the author. Ovary trilobate. The uterus is oval and does not reach the longitudinal excretory canals.

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Hymenolepis teresoides Fuhrmann, 1906

Synonyms: *Weinlandia teresoides* Mayhew, 1925; *Hymenolepis globulosa* Szpotańska, 1931; *Hym. rarus* Skrjabin, 1914?.

Hosts: *Anas platyrhynchos* (L.), *Dafila acuta* (L.), *Chaulelasmus streperus* (L.),*Chenopsis atrata* (Lath.), *Mareca penelope* (L.), *Netta rufina* (Pall.)?, *Nettion crecca* (L.), *Nyroca rufa* (L.) (new host), *Oidemia fusca steinegeri* Ridgeway.

Frequency and time of occurrence as observed by the present author: In four *Chaulelasmus streperus* (L.) out of the seven examined (57.1 %) I found one to ten specimens in one host at Drużno Lake in July and September. In one *Nyroca rufa* (L.) (new host) out of the 23 examined (4.3 %) I found one specimen at Drużno Lake in September.

Geographical distribution: Europe (Germany, the Soviet Union, Czechoslovakia, Poland), Asia (Syberia, Sakhalin), North America, Australia.

Localization: small intestine and ceca.

Morphology: More important figures concerning the anatomy of the species discussed are brought together in Table V so that a comparison may be made with *Hym. rarus* Skrjabin, 1914 and *Hym. globulosa* Szpotańska, 1931 whose specific distinction is doubtful, I think. The figures in the tables require descriptive explana-

tion. The dimensions of the strobila, scolex, rostellum, rostellar hooks, suckers, cirrus sac, Mehlis' gland, testes, ovary, vitelline gland and eggs vary within the admissible limits of individual and physiological variation. The location of the genital atrium of *Hym. globulosa* in the front third of the length of the margin of the proglottid does not constitute an essential difference. In the same tapeworm specimen a change of the location of the genital atrium may be observed, which depends on the degree of contraction of the muscles of the dermo-muscular body-wall. The number of rostellar hooks is reported to be different in the species discussed. Yet I suppose that it is constant and amounts to 18. The allegedly varying number of hooks may be accounted for by their falling out. This is confirmed by the fact that an odd number of hooks is too often found. There are no differences in their structure. The absence of the external seminal vesicle the function of which is done by a twisted seminal duct is said to be a specific feature of *Hym. rarus*. In his original work Skrjabin (1914c) says that the seminal duct forms a small enlargement which because of its small size cannot however be considered as an external seminal vesicle. This observation is not confirmed by a drawing quoted by Skrjabin. I was not able to examine the structure of the seminal duct between the external seminal vesicle and the testes in my material but I noticed that the size of the external seminal vesicle varies widely: it may be so small that it becomes hardly visible. The examination of the structure of the seminal duct of *Hym. teresoides* and *Hym. rarus* could explain the problem whether these two are separate species. On the other hand *Hym. globulosa* does not deserve in my opinion to be separated as an independent species since it is said to differ from *Hym. teresoides* in two features only: 1. the presence of a strong-muscled vagina forming numerous circumvolutions ('fait plusieurs circonvolutions') and 2. the uterus splitting into two parts in the culminative stage of development. I observed that the *Hym. teresoides* vagina shows the presence of strong-muscled walls conspicuous in its section between the poral excretory canals and the genital atrium. This feature is omitted in the diagnosis of *H. teresoides* by Fuhrmann (1906). The other section of the vagina has an undulatory course before its lumen enlarges into a longitudinal seminal vesicle. A straight or undulatory course of the vagina or even the formation of loops by it seems to be a variable feature as I showed on the example of *Drepanidotaenia lan-*

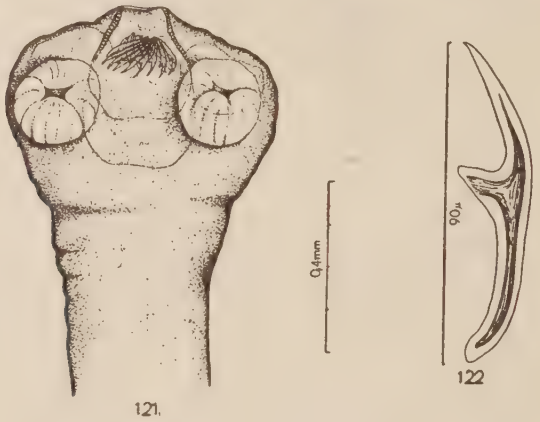
Table V

Figures concerning anatomical details of *Hym teresoides*, *Hym rarus* and *Hym. globulosa*

		Hymenolepis teresoides Fuhrmann, 1906		*Hym. rarus* Skrj., 1914 according to Skrjabin, 1914	*Hym. globulosa* Szpotańska, 1931 according to Szpotańska, 1931
		according to Fuhrmann and Skrj. et Math., 1945	own inwestigation		
1	Longitudo	40 — 80 mm	90 — 143 mm	70 mm (juvenis)	
2	Latitudo	1,7 — 2,5 mm	2,5 — 3,1 mm	1,36 mm (juvenis)	2,07 mm
3	Positio atrii genitalis	1/2 marg. lateralis	1/2 marg. lateralis	1/2 marg, lateralis	1/3 marg. lateralis
4	Scolex	500 μ — 530 μ Ø	520 — 630 μ Ø	440 μ Ø	
5	Rostellum	230 μ Ø	230 μ Ø		225 μ Ø
6	Quantum, longitudo et typus uncinulorum	15 — 16; 90 — 92 μ diorchis	16 — 17; 90 — 95 μ diorchis	14; 103 — 105 μ diorchis	16 — 18; 90 μ diorchis
7	Acetabula	160 μ — 190 μ Ø	180 — 196 μ Ø	170 μ Ø	
8	Cirrus		non armatus 17 — 19 μ Ø	non armatus	
9	Bursa cirri	380 × 100 μ	250 — 310 μ × 110 — — 160 μ	270 × 100 μ	304 × 72 μ
10	Glandula Mehlissi	48 μ Ø	49 — 78 μ Ø	100 μ Ø	
11	Vesicula seminalis int. ext	sunt	sunt		

12	Testes	200 — 240 μ Ø „V" „VII"	170 — 260 μ Ø „V" „VII"	170 — 190 μ Ø „V"	135 μ Ø „VII"
13	Vagina	straight tube	undulatory, muscular copulatory part		forms numerous circumvolutions
14	Receptaculum seminis	est	est		
15	Ovarium	bilobatum, latitudo lobi 160 — 240 μ	bilobatum, latitudo lobi 160 — 290 μ	bilobatum, latitudo lobi 110 — 126 μ	bilobatum, latitudo lobi 108 μ
16	Gl. vitellina	80 — 110 μ Ø	70 — 100 × 160 — 210 μ Ø	85 — 100 μ Ø	63 μ Ø
17	Uterus	sacciformis	sacciformis		sacciformis
18	Ovum	34 μ Ø	26 — 35 μ Ø		25,2 μ Ø
19	Oncosphaera				10,8 μ Ø
20	Localisatio	intestinum tenue,caeca	intestinum tenue	intestinum	intestinum
21	Habitaculum	*Chaulelasmus streperus* (L.) *Mareca penelope* (L.)	*Chaulelasmus streperus* (L.) *Nyroca rufa* (L.)	*Netta rufina* (Pall.)	*Chenopsis atrata* (Lath.)
22	Distributio geographica	Europe, Azerbaidjan	Drużno Lake, Poland	Turkestan	Australia

ceolata. The other feature, the dichotomy of the uterus (which does not occur very regularly) for that matter is a property of *H. teresoides* as already stated by Mathevossian (in Skrjabin & Mathevossian, 1945, p. 215, Fig. 154). As I observed it the



121. 122

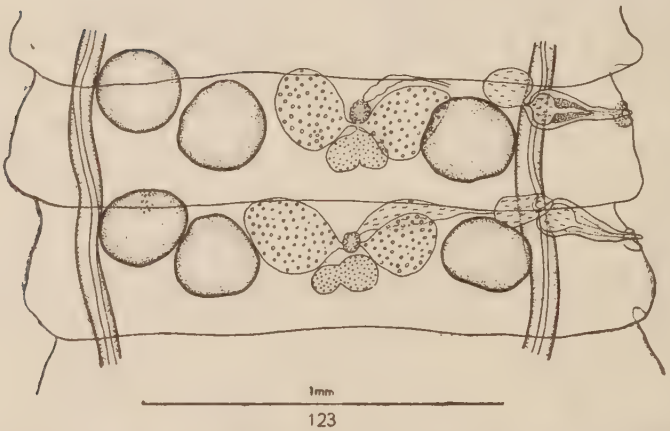


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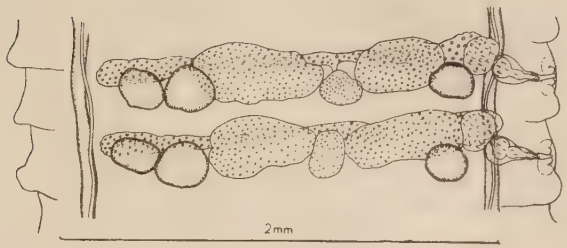
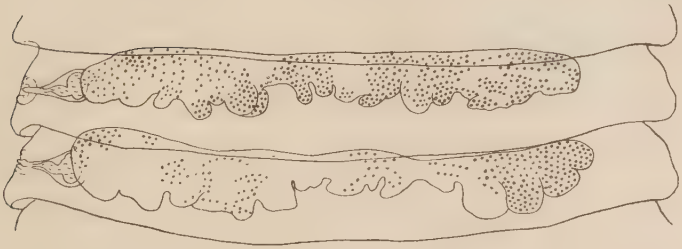
Fig. 121—123. *Hymenolepis teresoides* Fuhrmann, 1906. 121. Scolex with retracted rostellum. 122. Rostellar hook. 123. Hermaphrodite genital proglottid.

uterus develops at first as a transverse straight pipe running ventral to the ovary (Fig. 124 & 126). As it grows the uterus forms many thick diverticles turned to the back of the proglottid (Fig. 126). They then gradually disappear, except most often for only two





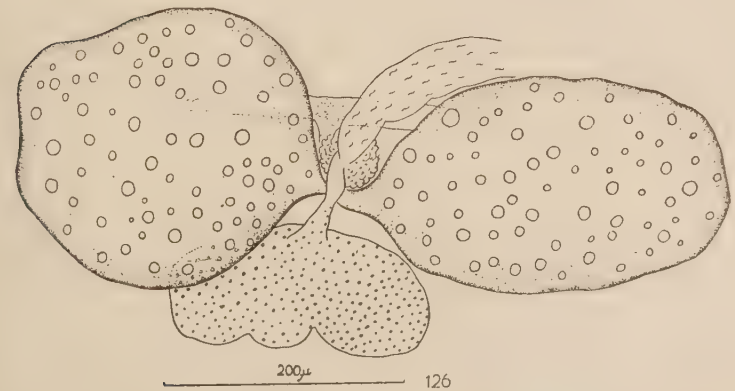


Fig. 124—126. *Hymenolepis teresoides* F u h r m a n n, 1906. 124. Hermaphrodite genital proglottid with growing uterus. 125. Young uterine proglottid. 126. Female glands.

enormous ones producing the impression that the uterus consists of two parts. The list of references by Szpotańska (1931) contains the work by Fuhrmann (1906) giving a description of *Hym. teresoides*, yet in her text Szpotańska does not compare her species with Fuhrmann's.

Fig. 127. *Hymenolepis teresoides* Fuhrmann, 1906. Genital atrium.

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Orlovilepis megalops (Nitsch in Creplin, 1829) Spassky et Spasskaja, 1954

Synonyms: *Taenia megalops* Nitsch in Creplin, 1829; *Taenia anatis marilae* Creplin, 1825; *Taenia cylindrica* Krefft, 1871; *Hymenolepis megalops* Parona, 1899, Ransom, 1902, Skrjabin et Mathevossian, 1945; *Weinlandia megalops* Mayhew, 1925; *Hymenolepis* (s. l.) *megalops* Lopez-Neyra, 1942.

Hosts: *Anas acuta tzitzihoa, Anas carolinense, Anas discors, Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anas rubripes* Brewser, *Cairina moschata* (L.), *Chaulelasmus streperus* (L.), *Cygnus cygnus* (L.), *Cygnus melona coryphus* Mol., *Dafila acuta* (L.), *Dafila spinicauda* (Vieillot), *Fuligula fuligula* (L.), *Fuligula marila* (L.), *Mareca americana, Mareca penelope* (L.), *Mareca sibilatrix* (Poep), *Metopiana peposaca* (Vieillot), *Netta rufina* (Pall.), *Nettion orecca* (L.), *Nyroca ferina* (L.), *Nyroca rufa,* (L.), *Oxyura leucocephala* (Scop.), *Querquedula querquedula* (L.), *Spatula clypeata* (L.), *Spatula platalea* (Vieillot).

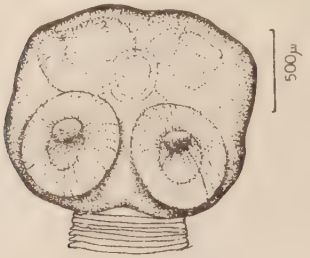
Frequency and time of occurrence as observed by the present author: in three *Anas platyrhynchos* (L.) out of the 77 examined (3.9 %) I found two to four specimens in one host in the District of Białystok and at Drużno Lake in July and November. In two *Anas platyrhynchos dom.* (L.) out of the one hundred examined I found two to six specimens in one host in the District of Lublin in May and August. In three *Nyroca rufa* (L.) out of the 23 examined (13 %) I found two to seven specimens in one host at Drużno Lake in September.

Geographical distribution: Eurasia, Africa, Australia, America.

Localization: rectum, cloaca.

Morphology: The scolex reaches 1.2 to 2.2 mm in diameter (1.1 to 1.4 mm after Skrjabin, 1917). The maximum width of the strobila 1.3 to 1.65 mm, the length 34 to 41 mm (0,75 mm wide and 35 to 54 mm long after Skrjabin, 1917). Cirrus sac elongated, poor-muscled, extensile. Its size varies greatly as the degree to which the internal seminal vesicle is filled with semen: 410 to 690 μ long and 70 to 140 μ thick (300 by 60 μ after Skrjabin, 1917). The cirrus armed, densely covered with short hair turned backwards (in the antiporal direction), reaches, when fully retracted, about 370 μ in length and about 18 μ in thickness (Fig. 130). A thick-walled, S-shaped vagina runs ventral to the cirrus sac and with no sharp

break passes into a seminal receptacle. Noteworthy in the excretory system is the presence, stated by myself, of thin transverse excretory canals connecting the ventral excretory canals and running in the back part of every proglottid behind the genital glands (Fig. 129). When fully mature, the sacciform uterus reaches somewhat beyond the longitudinal excretory canals.



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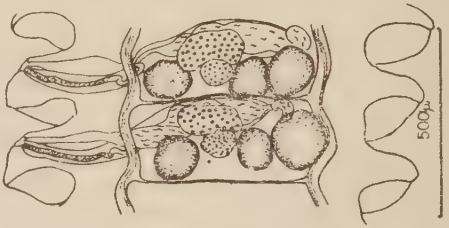

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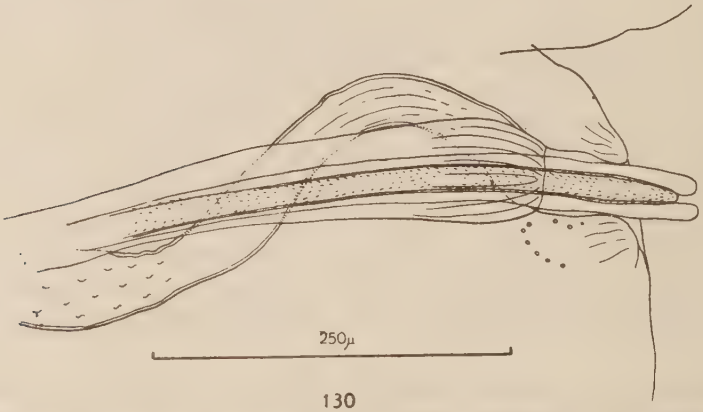

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Fig. 128—130. *Orlovilepis megalops* (Nitsch in Creplin, 1829) Spasssky et Spasskaja, 1954. 128. Scolex. 129. Hermaphrodite genital proglottid, 130. Genital atrium.

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Sobolevicanthus bisaccata (Fuhrmann, 1906) n. comb.

Synonyms: *Hymenolepis bissaccata* Fuhrm., 1906; Skrjab. et Math., 1945; *Drepanidotaenia (Drepanidolepis) bisaccata* (Fuhrm., 1906) Lopez-Nyera, 1942; *Bisaccanthes bisaccata* (Fuhrm., 1906) Spassky et Spasskaja, 1954.

Hosts: *Nettion brasiliense* (Gm.), *Nettion crecca* (L.), *Melanonyx fabalis* (Lath.), *Mareca penelope* (L.), *Dafila acuta* (L.), *Chaulelasmus streperus* (L.).

Frequency and time of occurrence (as I found them): In *Chaulelasmus streperus* (L.) in one specimen out of the seven examined (14.3 %) I found two tapeworm specimens at Drużno Lake in May.

Geographical distribution: Brazil, Azerbaidjan, Western Syberia, Poland.

Localization: small intestine.

Morphology: The outer appearance, particularly the front part of the body behind the scolex of *Sob. bisaccata* resembles *Drepanidotaenia lanceolata* (Bloch, 1782) except that the proglottids of the species discussed are somewhat longer. The whole length of immature specimens amounts to 108 mm, the maximum width 5.5 mm. According to Fuhrmann (1906) mature specimens are 100 mm long and 8 mm wide. Scolex, 158 to 190 μ in diameter and 118 to 150 μ long; 120 to 160 μ in diameter according to Fuhrmann. Four unarmed round suckers are about 80 to 90 μ in diameter; 40 by 60 μ according to Fuhrmann. On the rostellum is a single crown of eight hooks of a type transitory between 'skrjabinus' and 'diorchis'. The structure of the handle and the guard resembles the 'skrjabinus' type, while the proportion of the lengths of the handle and the blade (the blade being shorter than the handle with the guard) approximates this hook to the 'diorchis' type, just as the case is in *Sobolevicanthus octacantha* (Krabbe, 1869). Hooks, 33 to 35.2 μ long (according to Fuhrmann, 37 μ). The rostellar pouch reaches a little beyond the back margins of the suckers (Fig. 131). Collum short: almost directly behind the scolex are noticeable short and wide proglottids which increase their width very rapidly. The genital atrium lies half way through the right margin of the proglottid (according to Mathevossian it lies in the front half of the margin of the proglottid). The pore leading to the genital atrium is surrounded by a mild crateriform eminence. The depth of the genital atrium measured from the margin of the

proglottid amounts to about 100 μ, both parts of the accessory sac being retracted.

Male genital system. Cirrus cylindrical, concealed deep in the genital atrium and inconspicuous, is furnished inside with a stiletto widened in its proximal part. I was not able to see the stiletto when extruded outside and to measure its length, nor to examine whether the cirrus is armed. When fully extended and fullgrown the poor-muscled cirrus sac is 310 to 390 μ long and 70 to 115 μ wide; according to Fuhrmann it is far shorter (120 μ long) and does not reach the poral longitudinal excretory canals. Fuhrmann might have given the length of this organ when it was not quite mature and the measurements might have been taken from the bottom of the cirrus sac to the antiporal margin of the accesory

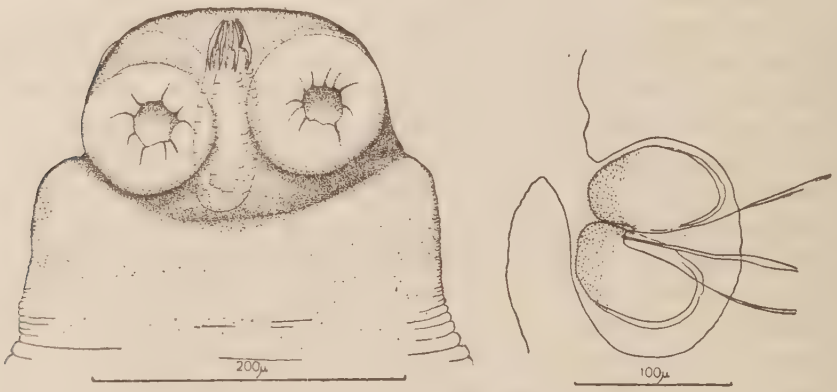

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Fig. 131—132. *Sobolevicanthus bisaccata* (Fuhrmann, 1906) n. comb. 131. Scolex with retracted rostellum. 132. Genital atrium with both parts of accessory sac turned inside out.

sac, and not to the bottom of the genital atrium. Most of the interior of the cirrus sac is occupied by the seminal vesicle. The accessory sac consists of two separate, as it were, small sacs (each of a diameter of 44 to 59 μ (according to Fuhrmann 50 μ), lying in a common pellicle, one of them being placed before and the other behind the cirrus sac, outside it and right at the bottom of the genital atrium. The interior of both parts of the accessory sac is lined with dense fine hair attached to the wrinkled cuticular layer. This lining

connects both parts of the accessory sac with a thin band running dorsal to the cirrus sac right at the bottom of the genital atrium (Fig. 132). This shows the unity of both parts of the accessory sac. Both parts of the accessory sac may turn inside out into the interior of the genital atrium. Three testes lying according to Type VII are irregularly round or oval in shape and 290 to 380 μ in maximum diameter, according to Fuhrmann (1906) 230 μ.

Female genital system. The female genital pore, lying ventral to the male one leads to the inconspicuous copulatory part of the vagina which runs ventral and a little backward to the cirrus sac and then crosses its antiporal part from the dorsal side and enlarges at the same time into an elongated seminal receptacle of an undulatory course. The seminal receptacle extends as far as the central line of the proglottid. The female genital glands lie centrally. The ovary forms many finger-shaped processes which sometimes, anastomosing with each other, occupy the whole length of the central part of the median area of the proglottid and overlap the poral and the central testes. A young uterus forms many blind, club-like diverticles and extends over the whole width of the proglottid.

The excretory system consists of two pairs of longitudinal canals of which the dorsal ones are considerably thinner than the ventral ones and have an undulatory course. It follows from a picture given by Skrjabin & Mathevossian (1945) that the thicknesses of the dorsal and ventral excretory canals are the same.

The muscular system. It is difficult to distinguish the bundles of longitudinal internal muscles from those of external ones in total preparations. Judging from the similarity of their structure the bundles of the internal longitudinal muscles are numerous.

Systematical situation. Spassky & Spasskaja (1954) formed the new genus *Bisaccanthes* for the above discussed tapeworm species on the evidence of two features distinguishing the only representative of this genus from those of the genus *Sobolevicanthus:* 1. Type VII of the location of the testes, and 2. The presence of a double accessory sac. Since a — *Sob. bisaccata* (Fuhrmann, 1906) n. comb. shows the presence of a cirrus stiletto, a feature immited in the characterization of the genus *Bisaccanthes* but enumerated in the diagnosis of the genus *Sobolevicanthus*; b — the *Sob. bisaccata* vagina has a course characteristic of those representative of the genus *Sobolevicanthus* I know, I think it legitimate

to include the species discussed to the genus *Sobolevicanthus*. The features suggested by the authors of the genus *Bisaccanthes* do not seem to be sufficiently substantiated as generic features. The difference between Type VII and Type V of the location of testes (Types III and V are characteristic of the genus *Sobolevicanthus*) is slight, while the double accessory sac in *S. bisaccata*, believed to constitute a property of the genus *Bisaccanthes* Spassky et Spasskaja, 1954, may be treated as one formation consisting of two parts. This is testified by the small pouch common to both parts of the accessory sac and by the anatomical continuity of the internal lining of them.

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Sobolevicanthus gracilis (Zeder, 1803) Spassky et Spasskaja, 1954

Synonyms: *Halysis gracilis* Zeder, 1803; *Taenia gracilis* Rudolphi, 1810; *Drepanidotaenia gracilis* Railliet, 1893; *Hymenolepis gracilis* Railliet, 1899; *Weinlandia gracilis* Mayhew, 1925; *Fuhrmanniella gracilis* Tseng Shen, 1932; *Hymenolepis (Weinlandia) gracilis* N. Lemaire, 1936; *Sphenacanthus gracilis* L. Neyra, 1942.

Hosts: *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anas rubripes* Brewser, *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.), *Dafila acuta* (L.), *Fuligula marila* (L.), *Mareca penelope* (L.), *Mergus merganser* (L.), *Mergus serrator* (L.), *Nettion crecca* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.) (new host), *Oxyura leucocephala* (Scop.), *Querquedula querquedula* (L.), *Spatula clypeata* (L.), *Tadorna tadorna* (L.) and *Phoenicopterus antiquorum* Temm. (= *Ph. roseus*) of the order *Phoenicopteriformes*.

Frequency and time of occurrence as observed by the present author: in sixteen *Anas platyrhynchos* (L.) out of the 77 examined (20.7%) one to 120 specimens in one host in the Districts of Warsaw and Białystok and at Drużno Lake in May, July, August, September, October, and November. In 31 *Anas platyrhynchos dom.* (L.) out of the one hundred examined (31%) I found one to 121 specimens in one host in the Districts of Lublin, Warsaw, Bydgoszcz, and Gdańsk in March, May, August, September, October and November. In two *Anser anser dom.* (L.) out of the 230 examined (0.8%) I found two

to six specimens in the District of Lublin in May and August. In one *Nettion crecca* (L.) out of the seven examined (14,3%) I found 12 specimens at Drużno Lake in November. In one *Nyroca rufa* (L.) out of the 23 examined I found three specimens at Drużno Lake in October. In two *Querquedula querquedula* (L.) out of the fourteen examined (14,2%) I found from 22 to 43 specimens in one host at Drużno Lake in July and September.

Geographical distribution: Europe (France, Germany, Denmark, Poland, Czechoslovakia, Yugoslavia, the Soviet Union), Asia (China, Japan, Syberia), North America, Africa (Egypt).

Localization: small intestine.

Morphology: The genus discussed is characterized by an extreme similarity of the structure of the strobila and the internal organs to *Hym. collaris* (Batsch). According to the literature accessible to me there exist only two features which make it possible to distinguish both species: 1. the structure of the scolex, the number and structure of rostellar hooks, and 2. the size of eggs. *Sob. gracilis* has eight rostellar hooks of the 'skrjabinus' type (Fig. 133), considerably longer (76 to 87 μ) than *Hym. collaris* hooks, which appear ten in number, are of the 'diorchis' type and 51 to 61 μ long. The *Hym. collaris* scolex does not show any essential differences in its structure and, to some extent, armature from the *Hym. compressa* and the *Hym. paracompressa* sp. n. scolices, which leaves room for a false denotation of young specimens of all three species. The *Sob. gracilis* scolex very easily falls off the strobila, and when it does both species (*Hym. collaris* and *Hym. gracilis*) cannot be distinguished. The difference in the size of the eggs is the other feature to allow both species to be distingushed. According to Skrjabin & Mathevossian (1945) *Sob. gracilis* eggs had not been known before. As I observed them their shape is spherical or slightly oval, while their diameter varies from 28 to 39 μ and the diameter of the oncosphere from 18 to 24 μ (Fig. 135). *Hym. collaris* eggs, on the other hand, are (according to Skrjabin, 1914) oval in shape, 75 μ long and 40 μ thick while the oncospheres are spherical and 42 to 44 μ in diameter. According to Lühe (1910[b]) *H. collaris* eggs are 42 to 44 μ in diameter, their shape being not described by the author. This justifies the supposition that what Lühe had to do with were spherical eggs of only a little larger size than *Sob. gracilis* and *Hym. compressa* or *Hym. paracompressa*. The

suspicion arises that none of the writers has hitherto dealt with whole *Hym. collaris* specimens and that this species has been described from fragments: the scolex and the hooks from one piece, with the confusion of the *Hym. compressa* and the *Hym. paracompressa* sp. n. scolices, and a strobila belonging to *Sob. gracilis* from another.

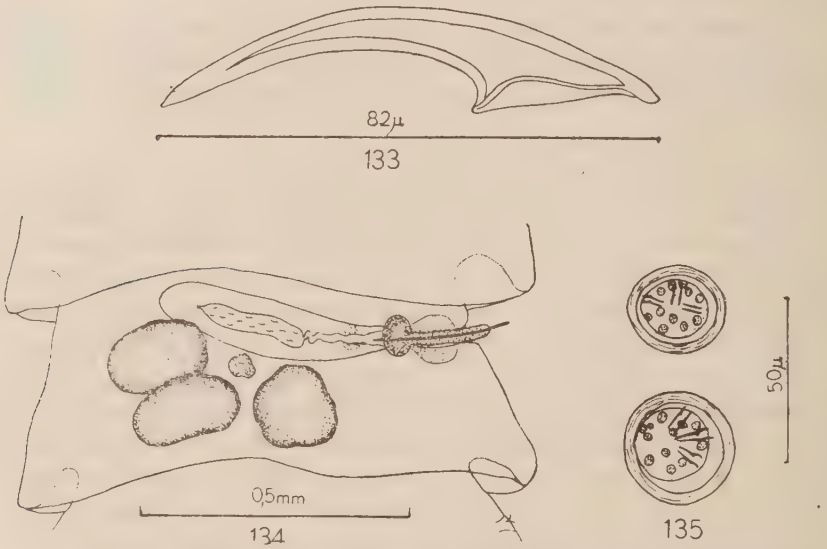
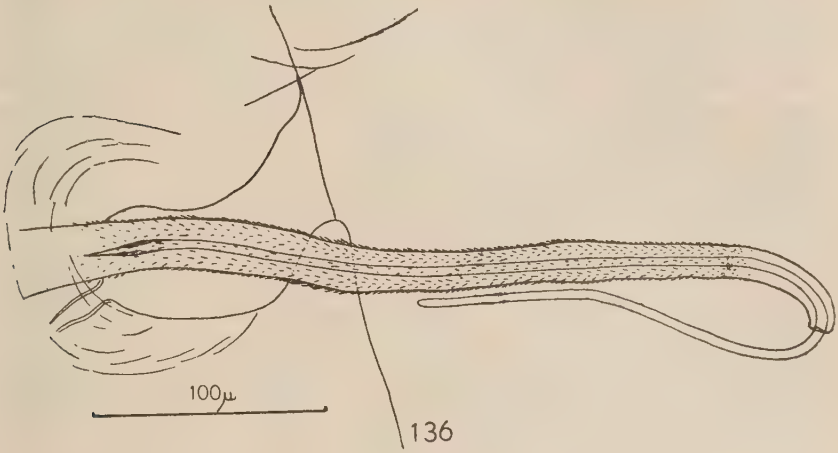


Fig. 133—135. *Sobolevicanthus gracilis* (Zeder, 1803). 133. Rostellar hook. 134. Young 'male' genital proglottid. 135. Eggs.

It is only *Hym. collaris* eggs, different in shape and size, described by Skrjabin, that seem to support the case of its being a separate species. The difference in the location of the testes between *Sob. gracilis* in which they are supposed to correspond to Type V (Fig. 134), and *Hym. collaris,* in which the location of the testes correspond to Type III, is in my opinion an unessential difference. Too often does the location of the testes in *Sob. gracilis* vary between Type V and Type III (the latter occurring even more frequently in this species) to ascribe to this feature any significance in differential diagnosis. It shoud also be stressed that all investigation has so far shown that the presence of the accessory sac and the cirrus stiletto is a feature correlated with the shape of the rostellar hooks of the 'skrjabinus' and not of the 'diorchis' type, which is

supposed to characterize *Hym. collaris*. The supposition of the identity of *Sob. gracilis* and *Hym. collaris* was already expressed by Dujardin (1845). Yet since there are no complete specimens at our disposal from which *Hym. collaris* was described the question



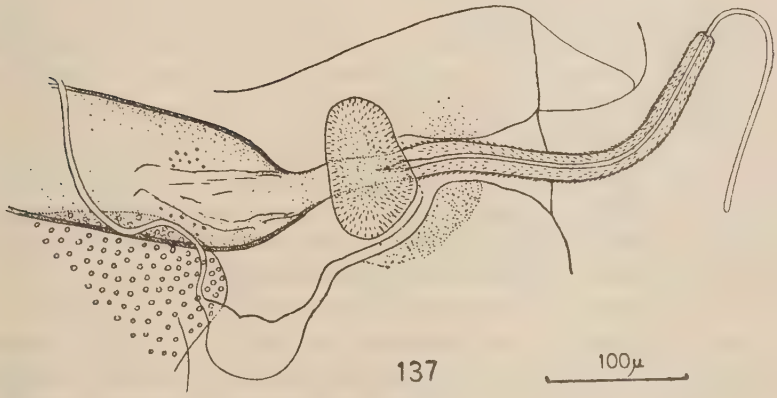


Fig. 136—137. *Sobolevicanthus gracilis* (Zeder, 1803). 136. Extended cirrus. 137. Genital atrium.

of whether this species is real ought to be left open. Spassky & Spasskaja (1954) do not adduce the name of 'collaris' in their new systematic arrangement, which suggests that they shared my doubts.

A more accurate description of the cirrus (Fig. 136 and 137) and the vagina (Fig. 137) ought to be added to the well-known details of the structure of *Sob. gracilis*. When fully extended the cirrus has a shape of a cylinder about 355 μ long and gradually mildly narrowing in the distal direction: the diameter at the base amounts to 20 to 24 μ, that at the top to 11 to 13 μ. The whole surface of the cirrus is covered with delicate bristle turned backwards. Only the short apical part of this organ is free from armature. Inside the cirrus is an elastic stiletto about 490 μ long and about 4 μ in diameter at the distal part. The basal part of the cirrus stiletto is widened to 7 μ in diameter and resembles the dart of a spear pointing to the antiporal direction. The copulatory part of the vagina has an incospicuous musculature resembling a sphincter. At a distance of a few scores of microns from the genital atrium the vagina often enlarges forming an extra seminal receptacle as it were (Fig. 137). The farther part of the vagina crosses the cirrus sac from the dorsal side and enlarges into the seminal receptacle proper. The opening section of the vagina has a slightly, undulatory course as a rule, sometimes the vagina forms a loop.

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Sobolevictanthus krabbeella (Hughes, 1940) n. comb.

Synonyms: *Hymenolepis fragilis* (Krabbe, 1869) Fuhrmann, 1906 nec *Taenia fragilis* Krabbe, 1869; *Hymenolepis fragilis* Lühe, 1910; *Hymenolepis krabbeella* (Fuhrmann, 1906) Hughes, 1940, Dubinina, 1953.

Hosts, stated by myself for the first time: *Anas platyrhynchos* (L.), *Querquedula querquedula* (L.); registered by myself and others: *Nettion crecca* (L.); known before yet not stated by myself: *Chaulelasmus streperus* (L.), *Nyroca ferina* (L.).

Frequency and time of occurrence as observed by the present author: In two *Anas platyrhynchos* (L.) out of the 77 examined

(2.6%) one tapeworm specimen in each case I found in September and November. In five *Nettion crecca* (L.) out of the seven examined (71.4%) one to twenty-one specimens in one host from September through November. In four *Querquedula querquedula* (L.) out of the fourteen examined (28.5%) one to three specimens in one host in August and September.

Geographical distribution: Europe (Mazury and the Districts of Lublin and Białystok in Poland), China, Western Syberia.

Localization: small intestine.

Morphology: I assign it to the genus *Sobolevicanthus* Spassky et Spasskaja, 1954 on the basis of the structure of the rostellar hooks, the presence of the cirrus with a stilletto, the accessory sac and other features and of the confirmed fact of the tapeworm species discussed parasitizing in water birds (*Anseriformes*). These authors did not mention the species *Sob. krabbeella* (Hughes, 1940) n. comb. in their list of species of the genus they created probably because they do not share the opinion of Hughes (1940) and Dubinina (1953) on the separate character of this species and the species *Sob. fragilis* (Krabbe, 1869) Spassky et Spasskaja, 1954, yet they do not take any stand on its synonymy. Hughes (1940) excludes from the species *Sobol. fragilis* (Krabbe, 1869) Spassky et Spasskaja after a description by Fuhrmann (1906) and by Joyeux & Baer (1936) a separate species *Hym. krabbeella* and leave under the name of *H. fragilis* the species described by Krabbe himself. Skrjabin & Math. (1945) do not consider both species to be different 'be it only because Fuhrmann's description is based upon Krabbe's original material i. e., this description only supplements Krabbe's while Joyeux & Baer (1936) drew on Fuhrmann's description only' (quoted after Skrj. & Mathev. 1945, p. 130). Skrjabin & Mathevossian did not known a publication by Hughes on this problem and remarked in their work that it was inaccessible to them. When examining tapeworms of Westren Syberian birds Dubinina, 1953 found in her material representatives of both species and was in a position to confirm their specific distinction. In her opinion Fuhrmann, though he used Krabbe's material, described under the name of *Hym. fragilis* a different tapeworm rightly denoted by Hughes (1940) as *Hym. krabbeella*. On the basis of my own material and Krabbe's and Dubinina's information I share the opinion of

Hughes and to substantiate it I quote the following differences making it possible to identify both species:

1. The *Sobolevicanthus fragilis* (Krabbe, 1869) cirrus sac is straight and extends across the proglottid only a little beyond its central line while the *Sobolevicanthus krabbeella* (Hughes, 1940) cirrus sac, the width of the proglottid being the same as in *Sob. fragilis*, runs across the proglottid forming a few loops or spiral circumvolutions and is about twice as long as the width of the proglottid.

2. The *Sob. fragilis* accessory sac forms a ring round the cirrus sac at the genital atrium (Dubinina, 1953), while the *Sob. krabbeella* accessory sac lies in the back of the cirrus sac at the genital atrium.

3. The *Sob. fragilis* cirrus is (Krabbe, 1869) 130 μ long, its apical part abruptly narrows and forms a short, thin finger-shaped process, the whole of the cirrus is densely covered with fine spines (Dubinina, 1953) while the *Sob. krabbeella* cirrus (as I found it) is 62 to 70 μ long, its free end tapers mildly, the whole of the organ being densely covered with small hair that reaches a maximum length of about 5 μ on the basal slightly enlarged part of the cirrus and gradually become shorter and shorter on the apical part.

4. The basal part of the *Sob. fragilis* cirrus stiletto is slightly widened and has the shape of a dart poining in the antiporal direction (Krabbe, 1869, Fig. 160), while in *Sob. krabbeella* I found no such formation in the structure of the stiletto.

5. The *Sob. fragilis* rostellar hooks are, according to Dubinina (1953), somewhat shorter than the *Sob. krabbeella* rostellar hooks although this is a wery small difference and one that falls under the compass of individual variation.

I should like to add the following particulars to the hitherto known description of *Sob. krabbeella*. The not quite mature specimens of this tapeworm species accessible to me were of considerably smaller dimensions than the specimens described by Fuhrmann (1906). According to Fuhrmann the length of the strobila amounts to 40 mm and its width to 1.3 mm. The largest specimens in my material were 13 mm long (minus the scolex yet including young uterine proglottids) and 0.82 mm in maximum width, 0.72 mm on the average. The width of the genital proglottids with differentiated genital female glands and a well-developed cirrus sac amounted to about $^3/_5$ width of the young uterine proglottids.

Male genital system. When fully extended the cirrus is 62 to 70 μ long (measured from the bottom of the genital atrium), 20 to 23 μ in maximum diameter near the base and 10 to 12 μ in diameter at the top, the cirrus resembling in its shape an elongated pear with a blunt end; the basal part of the cirrus is unarmed over a very short

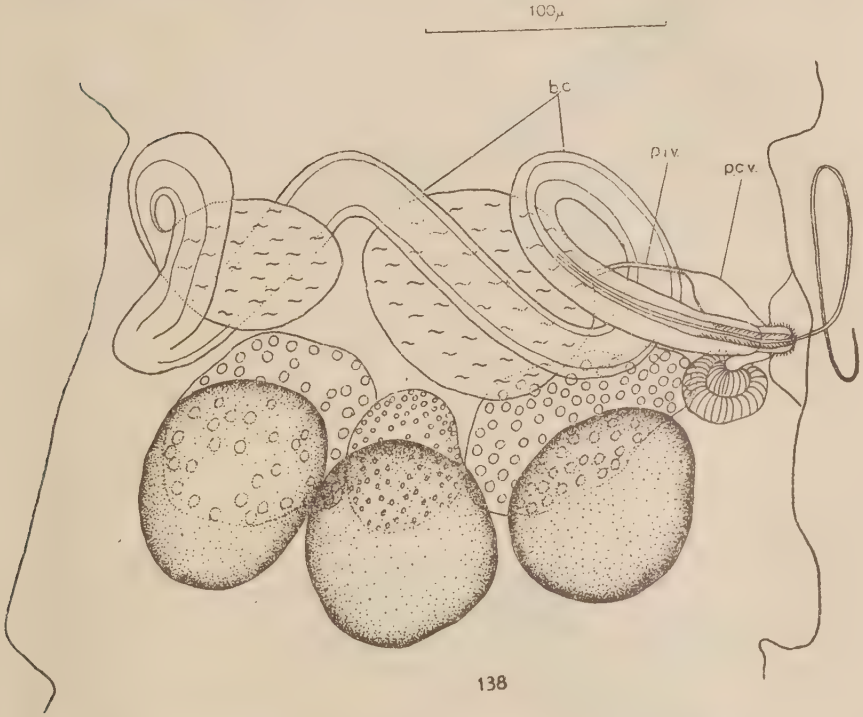
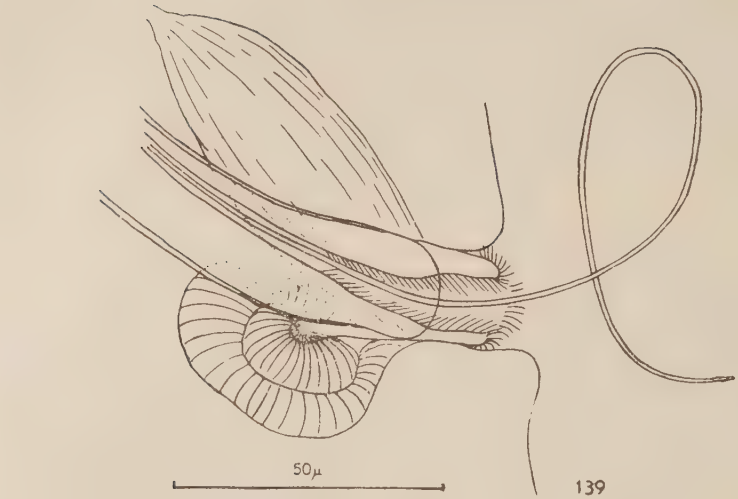


Fig. 138. *Sobolevicanthus krabbeella* (H u g h e s, 1940) n. comb. Hermaphrodite genital proglottid.

section (about 5 μ), enlarges mildly and then gradually tapers toward its free end. The whole surface of the cirrus extended outside the genital atrium is covered with thick hair longest at the enlargement near the base and shortest on the apical part of the cirrus (Fig. 140). The cirrus stiletto is thin, tread-like, very long, supple, about 1.2 μ in diameter, while its free end mildly tapers. A young cirrus sac of granular structure is conspicuous in the young genital proglottids in which the testes can already easily be distinguished from the anlage of the female genital glands. In such proglottids the cirrus sac is a regular cylinder in shape stretching across the proglottid



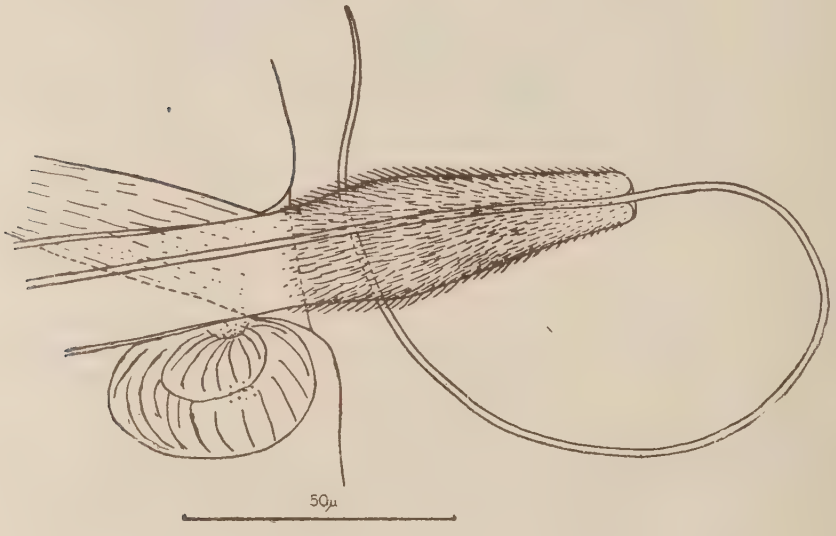


Fig. 139—140. *Sobolevicanthus krabbeella* (Hughes, 1940) n. comb. 139. Genital atrium with retracted cirrus. 140. Genital atrium with extended cirrus.

a little beyond the central line of the tapeworm body. Inside the cirrus sac at this stage of development is no well-developed cirrus stiletto yet. The further stages of development of the cirrus sac are difficult to follow. A few proglottids farther on, backwards, the structure characteristic of *Sob. krabbeella* can already be seen of the cirrus sac, fully ripe, long, forming loops and circumvolutions with a well-developed cirrus and stiletto (Fig. 138). The location of the circumvolutions and loops of the cirrus sac is iregular: in one proglottid the poral half of the sac has a slightly undulatory or even straight course, while the antiporal half forms many loops lying spirally, in another only one loop occurs in the poral part of the cirrus sac, the antiporal part forming many circumvolutions and so on. The musculature of the cirrus sac consists of a thin layer of muscles uniform in thickness. The external seminal vesicle, spherical or slightly oval of a diameter twice as large on the average as that of the cirrus sac, lies dorsal to its antiporal part or between the loops of the cirrus sac in the left half of the proglottid near its front margin.

Female genital system. The female genital pore, lying ventral to the male one, leads to the copulatory part of the vagina, wide, thick-walled and yet inconspicuous on the whole, 46 to 68 μ long and 17 to 26 μ in maximum diameter. The antiporal section of the copulatory part of the vagina narrows like a funnel and abruptly passes into a thin intermediate part. The copulatory part of the vagina runs forward oblique to the cirrus sac, the intermediate part crosses from the dorsal side the cirrus sac and enlarges into a large spherical or slightly oval seminal receptacle lying ventral to the cirrus sac and placed in the front half of the central area of the proglottid. According to Fuhrmann (1906, quoted after Skrj. & Mathev., 1945) the ovary is trilobate, the only poral lobe being under-developed, the two antiporal lobes better developed and the vitelline gland indistinctly lobate. As I observed it the ovary may also be bilobate and both lobes may be of almost the same size (Fig. 138). The vitelline gland is compact in structure and most frequently oval in shape. A sacciform uterus fills up almost the whole uterine proglottid.

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1. Krabbe, 1869, pp. 300—301, pl. VII, Fig. 158—160; 2. Lühe, 1910b, p. 69, Fig. 46. 3. Joyeux & Baer, 1936, p. 262, Fig. 251. 4. Hughes, 1940, p. 15. 5. Skrjabin & Mathevossian, 1945, pp. 129—130, Fig. 64. 6. Dubinina, 1953, pp. 129—130. Fig. 3. 7. Spassky & Spasskaja, 1954, pp. 95—98.

Sobolevicanthus octacantha (Krabbe, 1869) Spassky et Spasskaja, 1954

Synonyms: *Taenia octacantha* Krabbe, 1869; *Drepanidotaenia octacantha* Clerc, 1903; *Hymenolepis octacantha* Railliet, 1899; Fuhrmann, 1906 et 1932; *Weinlandia octacantha* Mayhew, 1925; *Dicranotaenia octacantha* Skrj. et Mathevossian, 1945.

Hosts: stated by Krotow (1949) and myself: *Querquedula querquedula* (L.); recorded before: *Anas platyrhynchos* (L.), *Chaulelasmus streperus* (L.), *Dafila acuta* (L.), *Nettion crecca* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), *Spatula clypeata* (L.).

Frequency and time of occurrence as observed by the present author: in two *Querquedula querquedula* (L.) out of the fourteen examined (14.2%) I found seven to fifteen specimens in one host in August and September. Krotow found the same tapeworm in 30 % of examined *Querquedula querquedula* (L.).

Geographical distribution: Europe (Drużno Lake, Mazury in Poland), Africa (Egypt), the Soviet Union (the regions of Novosibirsk, Tchelyabinsk, Azerbaidjan, Tchani Lake).

Localization: small intestine.

Morphology: Not quite mature specimens are 49 mm long, according to Skrjabin & Mathevossian (1945) — 60 mm; 1.089 mm in maximum width, according to Skrjabin & Mathevossian (1945) — 2 mm. The scolex (Fig. 141) 115 to 128 μ in diameter and 72 to 86 μ in length, is enlarged at its base and gradually tapers forwards passing with no sharp break into the rostellum. Four large oval unarmed suckers are 60 to 78 μ long and 45 to 50 μ wide, according to Skrjabin & Mathevossian — 70 to 90 μ long. The rostellum, 87 to 94 μ in length and about 20 μ in minimum diameter, is usually not fully extruded out of the rostellar pouch. The rostellar pouch reaches the level of the back edges of the suckers. Eight rostellar hooks 35 to 37 μ long (according to Skrj. & Math. — 36 to 37 μ) and of a shape transitory between the 'diorchis' and 'skrjabinus' types. The relation of the length of the blade to that of the handle and the structure of the guard is characteristic of the 'diorchis' type while the structure of the handle bears resemblance to the 'skrjabinus' type (Fig. 141). In Skrjabin & Mathevossian's opinion the structure of the *Sob. octacantha* hooks corresponds to the 'diorchis' type. Collum short, about 30 μ long and 85 μ wide.

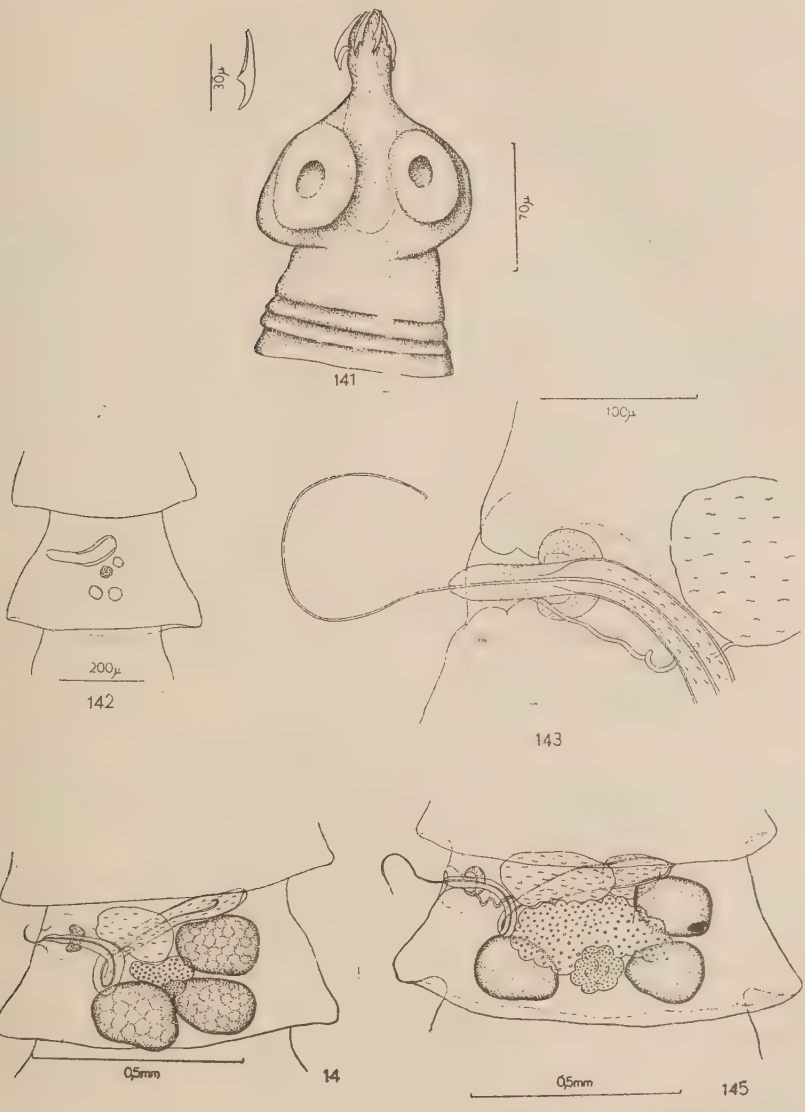

Fig. 141—145. *Sobolevicanthus octacantha* (K r a b b e, 1869), 141. Scolex with extruded rostellum. Next — rostellar hook. 142. Young genital proglottid. Immature cirrus sac and genital glands. 143. Genital atrium with extended cirrus. 144. Hermaphrodite genital proglottid. Immature ovary. 145. Hermaphrodite genital proglottid. Mature ovary.

Male genital system (Fig. 142—145). The cirrus is 23.5 to 26.7 μ in diameter and about 60 μ in length (according to Skrj. & Mathevossian 28 μ in diameter) and have the shape of a mildly tapering and blunt-ended cylinder (Fig. 143). The cirrus armature consists of small inconspicuous hair covering the basal part of this organ. The armature of the distal part of the cirrus may scale off. The cirrus stiletto is about 620 μ long, supple, thread-like, about 2.4 μ in diameter. Its proximal end is widened and resembles the dart of a spear. The length of the cirrus stiletto is almost equal to the length of the cirrus sac. The cirrus sac is 580 to 656 μ long and 50 to 62 μ in maximum width, poor-muscled, bent towards the back of the proglottid in its poral section like letter V, gradually enlarging in the antiporal direction. The accessory sac is like a crescent in shape and encompasses like a horseshoe the cirrus sac from the dorsal side right at the genital atrium, being 60 μ long and 20 μ thick on the average. A large internal seminal vesicle fills up most of the interior of the cirrus sac. An oval external seminal vesicle usually bends on to the dorsal side of the cirrus sac. The testes are, according to Skrj. & Math. slightly lobate in structure and 100 to 140 μ in diameter. As I found them the testes are oval in shape. have no incisions or lobes and reach 134 μ in short axis diameter and 256 μ in long axis diameter.

Female genital system (Fig. 143—145). The vagina, thin-walled, furnished near the genital atrium with an inconspicuous muscular sphincter runs oblique to the cirrus sac turned backwards, and makes many undulatory circumvolutions. Then the vagina crosses the cirrus sac from the dorsal side and rapidly enlarges into a great transverso-oval seminal receptacle. The seminal receptacle lies ventral to the cirrus sac in the front right-hand quarter of the central area of the proglottid and stretches only a little beyond the central line of the tapeworm body. A young uterus forms a number of finger-shaped processes which branch off again like trees. As the uterus matures the number of processes decreases and the uterus fills up almost the whole interior of the proglottid. No mature uterus or eggs were examined.

REFERENCES

1. Krabbe, 1869, p. 301, Fig. 161—162. 2. Lühe, 1910b, p. 68, Fig. 44. 3. Mayhew, 1925, p. 54. 4. Joyeux & Baer, 1936, p. 266, Fig. 235, 261. 5. Fedushin, 1937, p. 171. 6. Skrjabin & Mathevossian, 1945, p. 278, Fig. 214, 215. 7. Krotow, 1949, p. 100. 8. Dubinina, 1953, p. 134.

Sobolevicanthus wiśniewskii sp.n.

Hosts: *Nyroca ferina* (L.), *Nyroca rufa* (L.).

Frequency and time of occurrence: In *Nyroca ferina* (L.) in one host out of the six examined (16.6 %) 39 specimens were found on August 1950. In *Nyroca rufa* (L.) in three hosts out of the twenty-two examined (13.6 %) one to 42 specimens in one host on September 1950.

Geographical distribution: Poland (Drużno Lake, Mazury).

Localization: intestine.

Morphology: Abundant as my material was I had at my disposal only one wholly mature specimen which had been preserved whole and it is to this specimen that the figures for the maximum length 156 mm and width 4. 51 mm. The number of proglottids in this specimen amounts to 361. The anlage of the cirrus sac become noticeable in the 76th proglottid behind the scolex. The testes in the 85th proglottid simultaneously with the anlage of the female genital glands which differentiate into the vitelline gland and the ovary only in the 206th proglottid behind the scolex where the testes already approach full developement. The ovary and the vitelline gland disappear in the 280th proglottid making room for a developing uterus which fills with mature eggs in the 360th proglottid. The other measurements were taken from ten specimens. Scolex 218 to 298 μ in diameter and 159 to 228 μ in length. Four irregularly round suckers of 75 to 90 μ in diameter (Fig. 146). The rostellum is strong-muscled, 160 to 195 μ long, and 42 to 63 μ in maximum diameter, armed with eight hooks of the 'skrjabinus' type with a very long blade pointed to the ventral side and longer than the rudimentary guard and handle taken together (Fig. 147 & 148). The length of the hooks amounts to 64.0 to 66.4 μ, 65.0 μ on the average. The rostellar hook reaches far behind the back margin of the suckers. Near the bottom of the rostellar pouch starts the collum with a large accumulation of calcic corpuscles the abundance of which is characteristic of the whole of the collum and the growth zone (zona proliferans) as far as the first wide and very short proglottids. In those proglottids the number of calcic corpuscles is considerably smaller. The dimensions of the collum are on the average: 194 μ wide and 280 μ long.

The unilateral genital pores lie on the right-hand side of the

strobila in the front half of the margin of the proglottid. The genital atrium is furnished with a muscular sphincter.

Male genital system. When fully extended the cirrus is 32 to 40 μ in diameter at the base, 10 to 13 μ in diameter at the tip and 230 to 248 μ long. The whole surface of the cirrus is densely covered

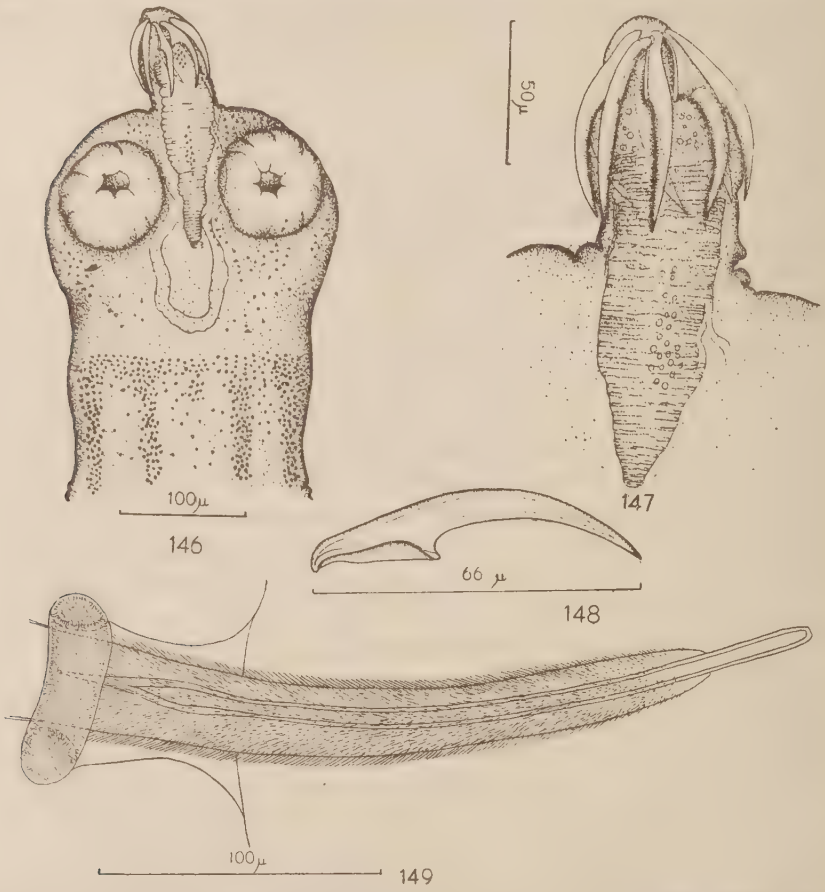

Fig. 146—149. *Sobolevicanthus wiśniewskii* sp.n. 146. Scolex with partly extruded rostellum. 147. Rostellum with rostellar hooks. 148. Rostellar hook. 149. Cirrus extended.

with delicate hair of the same length, turned to the genital atrium and only at a distance of about 50 μ from the distal end the hair becomes shorter and shorter while the very tip of the cirrus is quite bare. The cirrus is thickest at the base, tapers gradually and slightly in the distal direction, while the tapering is more distinct in the

apical part. Inside the cirrus is a stiletto the basal portion of which resembles the dart of a spear pointed against the antiporal direction; the diameter of the stiletto amounts to about 11 μ there, then the stiletto gets thinner to a diameter of 7 μ to preserve it as far as the end. It is difficult to determine the length of the stiletto because this organ is brittle and often breaks off, the maximum length of the stiletto as I found in my material amounts to 265 μ (Fig. 149). At the base of the cirrus is the external accessory sac (sacculus accessorius externus) lined inside with much small incospicuous hair. This sac is 21 to 32 μ thick and 65 to 82 μ long in a surface projection, its real length being larger since it encompasses like a horseshoe the base of the cirrus from the dorsal side (Fig. 149). The cirrus sac is poor-muscled, cylindrical, 90 to 135 μ thick and 730 to 820 μ long. Its fibres often run slightly oblique to its long axis. The internal seminal vesicle most often occupies 2/3 to 3/4 of the interior of the cirrus sac. The external seminal vesicle lies near the bottom of the cirrus sac in its extension, bends on to the dorsal side and sometimes encompasses the seminal receptacle like a horseshoe (Fig. 150 & 152). I found no efferent ducts. Three testes lie in the central area of the proglottid corresponding to Type V. one porally and two antiporally, the antiporal testis being shifted somewhat forwards. The three testes thus form an obtuse triangle the obtuse angle of which is pointing backwards. The shape of the testes varies greatly: from oval and spherical with a smooth surface (Fig. 152) to irregular with deep incisions on the surface forming a number of lobes (Fig. 151). The maximum dimensions of the testes amount to 280 to 420 by 320 to 670 μ; the poral testis is always the largest, oval or lobate, its long axis running across the proglottid in its back part behind the bottom of the cirrus sac.

Female genital system. The female genital pore lies ventral to the male one and leads to the strong-muscled copulatory part of the vagina, 60 to 82 μ thick and 180 to 210 μ long, running parallel with the cirrus sac or obliquely to the back of the proglottid. The proximal and distal parts of this section of the vagina narrow like a funnel (Fig. 155). The intermediate part of the vagina (part intermedia) is about 11 μ in diameter and runs somewhat to the back of the proglottid, crosses the poral excretory canals from the dorsal side, turns back making a mild arc towards the front and the middle of the proglottid, crosses the cirrus sac from the dorsal side right behind the poral excretory canals (just as in *Sobolevicanthus*

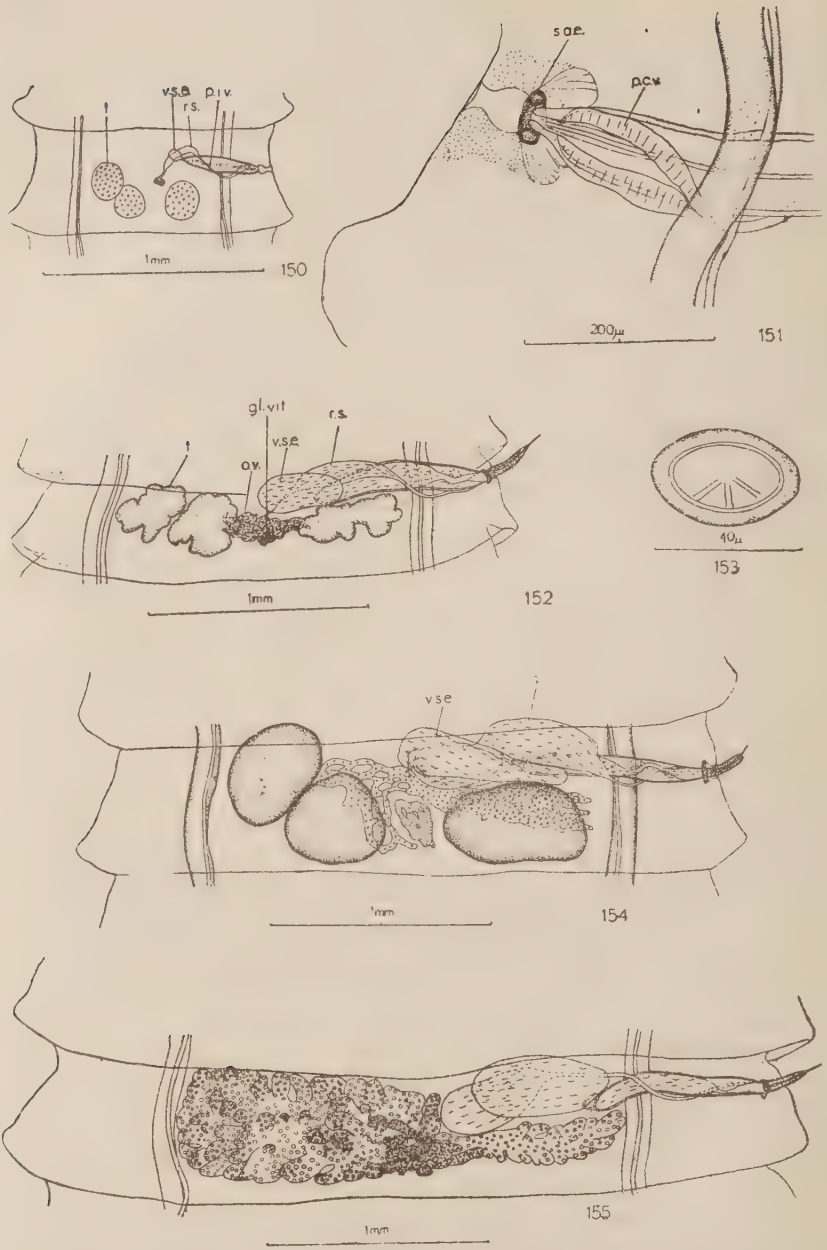

Fig. 150—155. *Sobolevicanthus wiśniewskii* sp.n. 150. Young 'male' genital proglottid. 151. Genital atrium; ventral view. 152. Hermaphrodite genital progrottid with notched testes. 153. Egg. 154. Hermaphrodite genital proglottid with smooth testes. 155. 'Female' genital proglottid. Ovary of maximum size.

gracilis) and rapidly enlarges into an elongated seminal receptacle. The seminal receptacle lies transversely in the front part of the proglottid and stretches as far as the central line of the tapeworm body. The seminal receptacle, lying at first dorsal to the antiporal part of the cirrus sac, then runs ventral to the external seminal vesicle (Fig. 151 & 153), though it happens to be encompassed by a horseshoe-shaped external seminal vesicle bending on to the dorsal side (Fig. 152). The ovary consists of a number of processes anastomosing with each other and making up a net conspicuous in the early stages of development of the ovary (Fig. 151 & 152). In the later stages of development the network structure of the ovary gets effaced as the processes grow and thicken (Fig. 153). The ovary stretches at first across the central area of the proglottid, ventral to the testes and then occupies almost the whole central area of the proglottid and reaches as far as the poral and antiporal excretory canals (Fig. 151 & 153). The poral part of the ovary is usually less well-developed than the antiporal. The vitelline gland lies on the central line of the proglottid between the central and the poral testes in the back half of the proglottid and shows a network structure similar to that of the ovary. Due to many processes joining each other the shape of the ovary is irregular, while the vitelline gland is on the whole thin and long in the early stages of development (Fig. 152), it grows wider (Fig. 153) to reach a size of 154 to 270 by 290 to 452 μ in the later stages. The presented dimensions of the vitelline gland vary greatly because single processes of this organ sometimes stretch at a comparatively great distance from the bulk of the vitelline gland. The vitelline gland most often lies ventral to the ovary although exceptions to this rule do occur (Fig. 153). As a rule the vitelline gland lies in the hollow of the ovary at its back. The uterus lies ventral to the ovary and shows at first the presence of wide diverticles which disappear as they fill up with eggs so that the uterus then looks like uniform sacciform body which tightly fills up the whole of the proglottid stretching from its poral to its antiporal margins (Fig. 154). Eggs oval, 25 to 28 μ thick, 37 to 43 μ long; the intermediate shell 18 to 20 μ by 29 to 32 μ; oncosphere 16 to 18 μ by 27 to 30 μ. Three pairs of embryonic hooks with long handles and short blades and guards (Fig. 156).

Excretory system consists of two pairs of longitudinal canals. The ventral canals are 52 to 135 μ in diameter, the dorsal ones 12

to 22 μ in diameter. The poral excretory canals run ventral to the genital ducts. No transverse excretory canals were observed.

Muscular system I failed to examine minutely as I had no material suitable for microtomic sections. In total preparations very numerous bundles of longitudinal muscles, 98 in number, can be seen, yet it is very difficult to distinguish the layer of internal longitudinal from that external ones.

Differential diagnosis

Although the structure of the ovary and the vitelline gland of the new species described above might seem sufficient to substantiate the specific distinction of. *S. wiśniewskii* sp.n. I think it necessary to compare it with the species known hitherto which show resemblance in the structure of the strobila and the organs, and the rostellar hooks in particular. The following known species I make the object of a detailed analysis:

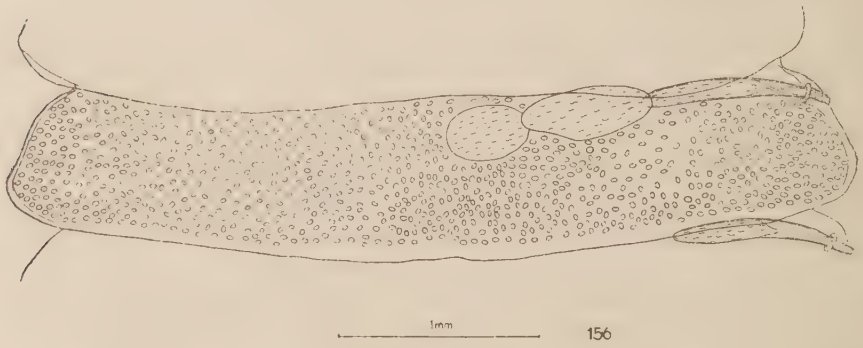

Fig. 156. *Sobolevicanthus wiśniewskii* sp.n. Uterine proglottid.

1. *Sphenacanthus cyrtoides* (Mayhew, 1925) Lopez-Neyra, 1942 from the *Erismatura jamaicensis* Blank intestine. Similarities: the number, structure and dimensions of the rostellar hooks, the topography of the genital organs, the size of eggs and oncospheres. Differences: no accessory sac in *Sph. cyrtoides;* a very long elastic cirrus stiletto, coiled inside the cirrus sac; ovary, bilobate or trilobate, with no finger-shaped processes; vitelline gland compact; cirrus judging from the drawing, unarmed; the vagina, does not cross the cirrus sac from the dorsal side; the size of whole specimens is 3 to 10 mm by 0,4 mm; particularly small cirrus sac. (I take into account the representatives of the genus *Sphenacanthus*

Lopez-Neyra, 1942 as well as its main morphological feature, lack of accessory sac, may be overlooked when analysed).

2. *Sobolevicanthus columbae* (Zeder, 1800) Spassky et Spasskaja, 1954, a parasite of *Columbiformes*. Similarities: number and shape of rostellar hooks (their length amounts to 72 μ according to Joyeux te Baer, 1936); size and structure of accessory sac, topography of sexual glands; course of vagina and its location to cirrus sac; structure of uterus, diameter of oncosphere. Differences: accessory sac lined with long bristle reaching a length of 18 to 20 μ, cirrus sac 560 μ long, no strong musculature of copulatory part of vagina. Lack of more accurate information on other features essential for systematization such as the shape of eggs, the structure and armature of the cirrus which is only said to be elongated and armed, does not allow any more detailed analysis to be made. Spassky and Spasskaja (1954) suppose *Sobolevicanthus serrata* (Fuhrmann, 1906) Spassky et Spasskaja, 1954, conditionally assigned to the genus *Sobolevicanthus* as no accessory sac was found in it, to be a synonym of *S. columbae* (Zeder, 1800). Since *S. serrata* (Fuhrmann, 1906) has hooks more like the 'nitidus' than the 'skrjabinus' type, and since moreover their length amounts to 102 μ I think that its definite identification with *S. columbae* (Zeder, 1800) would contribute to laying a still greater emphasis on the morphological differences proving the specific distinction of *Sobolevicanthus wiśniewskii* sp.n. At the same time however the observations made by Joyeux & Baer (1936) concerning the size and shape of *S. columbae* (Zed., 1800) hooks would have to be revised in order to find the admissible scale of variation of the above features within this species.

3. *Sobolevicanthus stolli* (Brock, 1941 pro parte Schiller, 1954) n. comb. Similarities: number and shape of rostellar hooks; topography of internal organs; shape of cirrus. Differences: longer rostellar hooks (according to Schiller, 1954 they are 70 μ, while judging from the included drawing by the same author they amount to 73 μ in length); smaller cirrus sac, 411 μ (308 to 504 μ) long and 111 μ (97 to 127 μ) thick; considerably large accessory sac, 134 μ (113 to 157 μ) long and 77 μ (63 to 93 μ) wide; cirrus, as judged from the drawing, considerably smaller: about 100 μ long, 14 μ in diameter at the base and 8 μ in diameter in the distal part; cirrus stiletto, long thread-like, supple; female genital glands of compact structure; eggs, oval, 30 to 45 μ in diameter. Schiller (1954) is

of the opinion that *S. stolli* (Brock, 1941) was later twice described under the name of *Hym. mastigopraedita* Polk, 1942 and that of *Hym. dafilae* Polk, 1942. Lack of original works by this author prevents me from making closer comparative analysis of the above mentioned species.

REFERENCES

1. Fuhrmann, 1906 , pp. 448—449, Fig. 32—33. 2. Mayhew, 1925. 3. Joyeux & Baer, 1936, p. 373, Fig. 442. 4. Brock, 1941, pp. 135—138, Fig. 1—3. 5. Lopez-Neyra, 1942. 6. Davis, 1945a, pp. 213—219. 7. Skrjabin & Mathevossian, 1945. 8. Mathevossian, 1946. 9. Schiller, 1954, pp. 197—199, Fig. 4—5. 10. Spassky & Spasskaja, 1954, pp. 95—105.

I give the name of *Sob. wiśniewskii* sp.n. to the species in honour of Prof. dr Wincenty Lesław Wiśniewski, to whom I owe very rich faunistic materials of Drużno Lake.

Sphenacanthus fasciculata (Ransom, 1909) Lopez-Neyra, 1942

Synonyms: *Taenia fasciata* Krabbe, 1869 nec *Taenia fasciata* Rudolphi, 1810 (*T. fasciata* Rudolphi, 1810 = *T. setigera* Frölich, 1789, according to Ransom, 1909, p. 93); *Drepanidotaenia fasciata* Railliet, 1893; *Diplacanthus (Dilepis) fasciata* Cohn, 1899; *Hymenolepis (Drepanidotaenia) fasciata* Cohn, 1901; *Hymenolepis fasciata* Mayhew, 1925; *Hym. longicirrosa* Fuhrmann, 1906 (according to Dubinina, 1948).

Hosts: *Anser albifrons* (Scop.), *Anser anser* (L.), *Anser anser dom.* (L.), *Anser erythropus* (L.), *Cygnopsis cygnoides* (L.), *Dafila acuta* (L.), *Mareca penelope* (L.), *Melanonyx fabalis* (Lath.), *Nettion crecca* (L.), *Nyroca ferina* (L.).

Frequency and time of occurrence as observed by the present author: in *Anser anser dom.* (L.) in 13 hosts out of the 230 examined (5.6 %) from one to 61 tapeworms in one host from May to October.

Geographical distribution: Europe, Asia (China, Japan, Syberia, India). In Poland, as I found it, in the Districts of Lublin and Gdańsk.

Localization: small intestine.

Morphology sufficiently examined by the authors quoted in the list of references. It is noteworthy that Lopez-Neyra established (according to Spassky & Spasskaja, 1954) the presence of the cirrus stiletto in the preparations from Fuhrmann's collection. This is one of the characteristic features of the species *Sphenacanthus* Lopez-Neyra, 1942.

REFERENCES

1. Krabbe, 1869, p. 300, Fig. 156—157. 2. Blanchard, 1891, pp. 119—120. 3. Railliet, 1893. 4. Stiles, 1896, pp. 37—38, Fig. 56—79. 5. Cohn, 1899. 6. Cohn, 1901, p. 329. 7. Fuhrmann, 1906 , pp. 751—752, Fig. 17—18. 8. Ransom, 1909, p. 93. 9. Lühe, 1910b, pp. 69—70, Fig. 47. 10. Skrjabin, 1914, pp. 470—471, Fig. 66—67. 11. Skrjabin, 1915, pp. 225—229, Fig. 1—2. 12. Skrjabin, 1917a, pp. 452—454, Fig. 152—154. 13. Mayhew, 1925, p. 94. 14. Tseng Shen, 1932, p. 149. 15. Fuhrmann, 1932, p. 148, Fig. 124. 16. Joyeux & Baer, 1936, pp. 262, 503, Fig. 250. 17. Neveu-Lemaire, 1936, pp. 485—486. 18. Lopez-Neyra, 1942. 19. Skrjabin & Mathevossian, 1945, pp. 124—126, Fig. 58. Dubinina, 1948, pp. 174—175. 21. Paruchin, 1954, pp. 227—253. 22. Spassky & Spasskaja, 1954. p. 195.

Sphenacanthus macrocephala (Fuhrmann, 1913) Lopez-Neyra, 1942

Synonyms: *Hymenolepis macrocephala* Fuhrmann, 1913.

Host, as found by other authors and myself: *Anas platyrhynchos* (L.); as found by myself for the first time: *Nyroca ferina* (L.) and *Nyroca rufa* (L.).

Frequency and time of occurrence as observed by the present author: in fourteen *Anas platyrhynchos* (L.) out of the 77 examined (18.2 %) from two to 47 specimens in one host in July and September. In one *Nyroca ferina* (L.) out of the six examined (16.6 %) I found four specimens in July. In one *Nyroca rufa* (L.) out of the 23 examined (4.3 %) I found sixteen specimens in September.

Geographical distribution: Norway, Poland (Mazury, Drużno Lake), the Soviet Union (the region of Leningrad).

Localization: intestine.

Morphology: To supplement the description by Fuhrmann (1913) I measured ten specimens. The maximum length of not quite mature specimens amounts to 60 mm (according to Fuhrmann 35 to 40 mm), the width to 1.2 to 2.4 mm (according to Fuhrmann 1 mm). Scolex large, 630 to 820 μ in diameter and about 510 to 600 μ long. It is difficult exactly to measure the length of the scolex because of the almost terminal location of large suckers, 300 to 410 μ in maximum diameter. The rostellum is hidden inside a large strong-muscled rostellar pouch, reaches beyond the back margins of the suckers and amounts to about 30 to 39 μ in diameter and 235 to 248 μ long (Fig. 157). The tip of the rostellum is armed with a single crown of eight hooks of a type transitory between 'nitidus' (the handle being somewhat longer than the blade) and 'skrjabinus' (the

structure of the handle). The hooks are 54 to 59 μ long (according to Fuhrmann, 1913, 57 to 63 μ; Fig. 157). In the front half of the right margin of the proglottid is a fairly deep genital atrium with

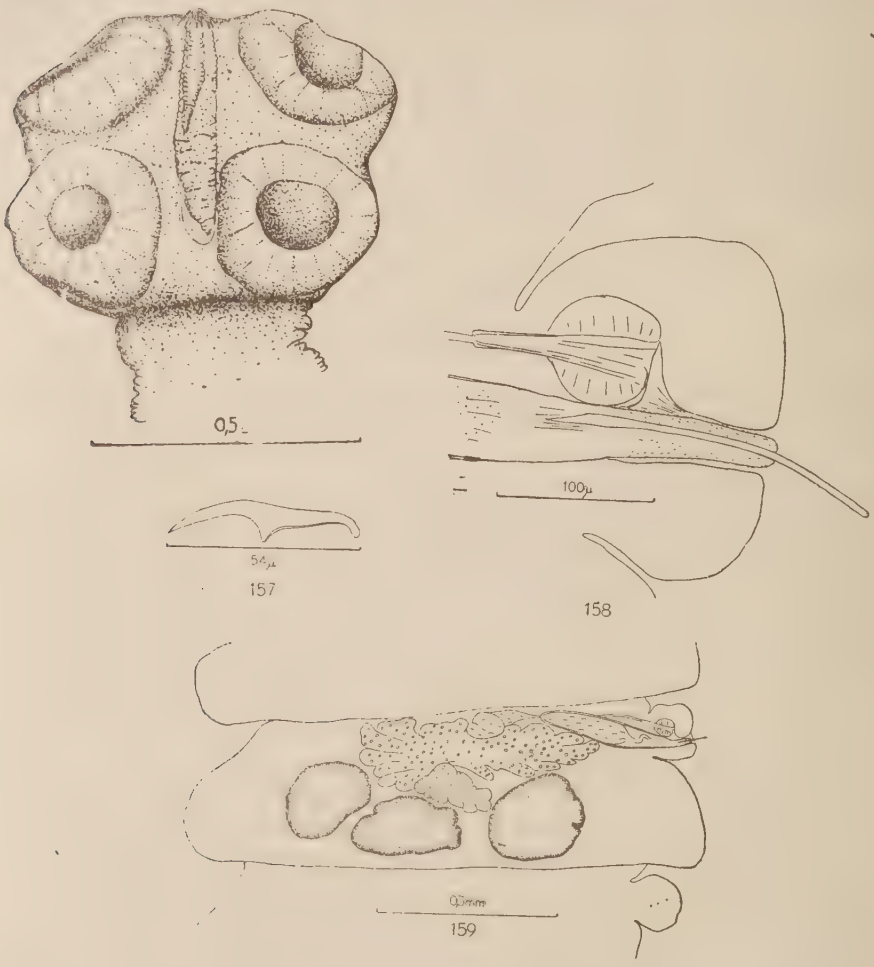

Fig. 157—159. *Sphenacanthus macrocephala* (Fuhrmann, 1913) Lopez-Neyra, 1942. 157. Scolex with partly extruded rostellum. Below — rostellar hook. 158. Protruded genital atrium. 159. Hermaphrodite genital proglottid.

a musculature allowing it to be thrust outside, its shape being that of a large mushroom-like nipple (Fig. 158 & 159).

Male genital system. The cirrus is armed with very small spines, seen only under immersion and easily wearing off, and has the shape

of a cylinder gradually tapering towards the free end and rounded at the tip. The length of the cirrus amounts to 108 to 122 μ; the diameter is 29 to 33 μ at the base and 17 to 23 μ near the tip. Inside the cirrus is a tabular stiff brittle stiletto widened a little at the base and resembling a dart pointed in the antiporal direction. The whole stiletto is about 220 μ long and about 4 μ in diameter except for the widening at the base (Fig. 158). The cirrus sac is poor-muscled, 60 μ by 240 μ, does not reach the half of the width of the proglottid but crosses the poral longitudinal excretory canals. The external seminal vesicle, well-developed, often bends on to the dorsal side. The irregularly spherical testes, often with incisions on their surface have the location corresponding to Type VI (and not Type IV as reported by Skrj. & Math., 1945, p. 160) and a diameter of 130 to 300 μ (according to Fuhrmann 120 to 140 by 80 to 90μ).

Female genital system. The female genital pore, lying ventral to, before or behind, the male genital pore, leads to a spacious funnel-like copulatory part of the vagina with thickened walls furnished with a strong sphincter which resembles a sphere and is about 65 to 80 μ in diameter (according to Fuhrmann 60 μ). The length of the copulatory part of the vagina corresponds to the length of the cirrus. The ovary, deeply lobate, lies in the central area of the proglottid, most often in its front section, stretching from the poral to the antiporal excretory canals. A lobate vitelline gland lies centrally. Its maximum length (measured across the proglottid) amounts to 240 to 310 μ (according to Fuhrmann 140 μ), while the width (measured along the proglottid) to 120 to 160 μ. Uterus sacciform, with diverticles.
from the poral to the antiporal excretory canals. A lobate vitelline gland lies centrally. Its maximum length (measured across the proglottid) amounts to 240 to 310 μ (according to Fuhrmann 140 μ). while the width (measured along the proglottid) to 120 to 160 μ. Uterus sacciform, with diverticles.

Excretory system consists of two pairs of longitudinal excretory canals of which the ventral ones are considerably thicker than the dorsal ones. I found no transverse excretory canals.

Muscular system consists of many bundles of external and internal longitudinal muscles, conspicuous in some total preparations.

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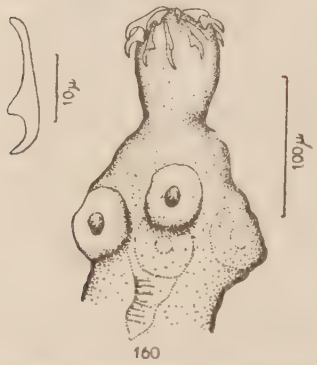
1. Fuhrmann, 1913, pp. 19—21, Fig. 9—10. 2. Fuhrmann, 1932, p. 149. 3. Joyeux et Baer, 1936, pp. 260—261, Fig. 247. 4. Skrjabin et Mathevossian, 1945, pp. 160—162, Fig. 97.

Subfamilia *Fimbriariinae* Wolffhügel, 1900
Fimbriaria fasciolaris (Pallas, 1781) Wolffhügel, 1900

Synonyms: *Taenia fasciolaris* Pallas, 1781; *Taenia malleus* Goeze, 1782; *Fimbriaria malleus* Frölich, 1802; *Epision plicatus* Linton, 1892; *Notobothrium arcicum* Linstow; *Fimbriaria fasciolaris* Wolffhügel, 1900; *Taenia pediformis* Krefft, Johnston, 1912; *Alyselminthus malleus* Zeder; *Halysis malleus* Zeder; *Taenia trilineata* Batsch; *Fimbriaria mitra* Frölich; *Fimbriaria plana* Linstow, 1905? (according to Wolffhügel, 1936).

Hosts: *Alopochen aegyptiaca* (L.), *Anas acuta tzitzihoa*, *Anas formosa* Georgi, *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anas rubripes* Brewser, *Anas superciliosa* Gmelin, *Cairina moschata* (L.), *Chaulelasmus streperus* (L.), *Clangula hyemalis* (L.), *Dafila acuta* (L.), *Eider molissimus* (L.), *Fuligula fuligula* (L.), *Fuligula marila* (L.), *Glaucionetta clangula* (L.), *Mareca penelope* (L.), *Melanitta deglandi* Bonaparte, *Melanitta fusca* (L.), *Mergus merganser* L., *Mergus serrator* L., *Netta rufina* (Pallas), *Nettion castaneum* (Eyton), *Nettion crecca* (L), *Nyroca ferina* (L.), *Nyroca rufa* (L.) (new host), *Oidemia nigra americana* (Swainson), *Oxyura leucocephala* (L.), *Querquedula auerquedula* (L.), *Spatula clypeata* (L.) and *Gallus dom.* of the order *Galliformes*.



160

Fig. 160. *Fimbriaria fasciolaris* (Pallas, 1781) Wolffhügel, 1900. Scolex with extruded rostellum. Next — rostellar hook.

Frequency and time of occurrence, as observed by the present author: in 36 *Anas platyrhynchos* (L.) out of the 77 examined (46,7 %) one to forty specimens in one host of Drużno Lake and the Districts of Białystok and Warsaw in March, April, May, July, August, September, October and November. In twenty *Anas platyrhynchos dom.* (L.) out of the one hundred examined (20%) from one to 64 specimens in one host of the Districts of Lublin, Warsaw, Bydgoszcz and Gdańsk in March, May, August, September, October and November. In one *Anser anser dom.* (L.) out of the 230 examined (0,4%) I found two specimens of this parasite in the Lublin slaughter-house in August.

In the only one *Fuligula fuligula* (L.) examined I found two specimens at Drużno Lake in November. In one *Nettion crecca* (L.) out of the seven examined (14,3%) I found three specimens at Drużno Lake in September. In three *Nyroca ferina* (L.) out of the six examined (50%) I found four to forty-four specimens in one host at Drużno Lake in July and August. In sixteen *Nyroca rufa* (L.) (new host) out of the twenty-two examined (69,5%) from one to 101 specimens in one host at Drużno Lake in July, August and September. In one *Querquedula querquedula* (L.) out of the fourteen examined (7.1%) I found 22 specimens at Drużno Lake in September.

Geographical distribution: Europe (Germany, France, Poland, Czechoslovakia, the Soviet Union), Australia, Greenland, Brazil, Asia (India, China, Syberia), Africa, North America (Alaska — Schiller, 1951).

Localization: small intestine.

Morphology, sufficiently elaborated by Wolffhügel (1900, 1936) and Fuhrmann (1914).

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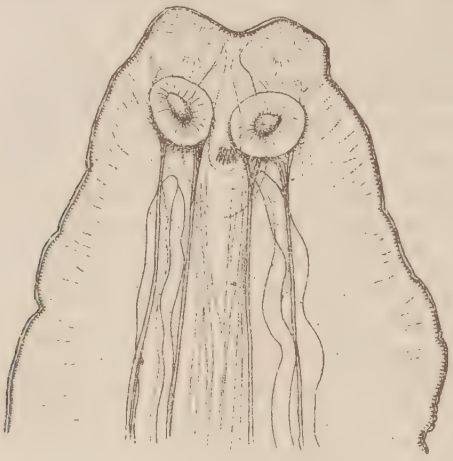
Subfamilia *Diploposthinae* Skrjabin et Mathevossian, 1941

Diploposthe laevis (Bloch, 1782) Jacobi, 1897

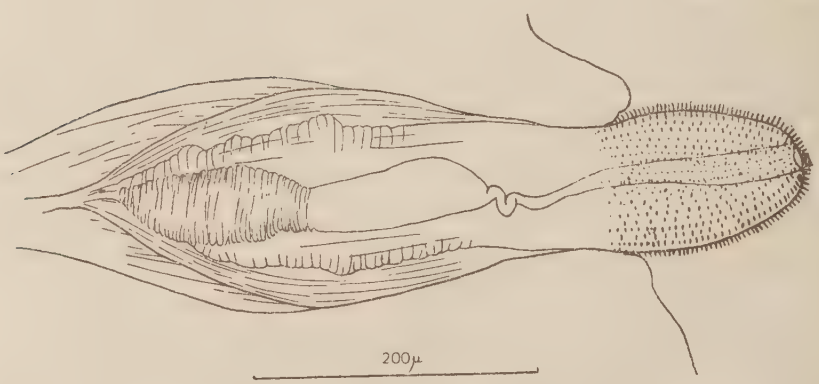
Synonyms: *Taenia laevis* Bloch, 1782; *Taenia bifaria* Siebold (Creplin, 1846); *Cotugnia bifaria* Diamare, 1893; *Taenia tuberculata* Krefft, 1871; *Diploposthe lata* Fuhrmann nom. nud., 1900; *Diploposthe sui generis* Kowalewski, 1903; *Diploposthe laevis* Jacobi, 1897.

Hosts: *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anas rubripes* Brewser, *Anas superciliosa* Gmelin, *Anser anser dom.* (L.) (new host), *Aythya affinis* (Eyton), *Aythya africana* (Gm.), *Aythya americana* (Eyton), *Aythya australis* (Eyton), *Chaulelasmus streperus* (L.), *Cygnopsis cygnoides* (L.), *Fuli-*

gula fuligula (L.), *Fuligula marila* (L.), *Glaucionetta clangula* (L.), *Koranta canadensis* (L.), *Netta rufina* (Pallas), *Nettion castaneum* (Eyton), *Nettion crecca* (L.), *Nyroca baeri* (Swith), *Nyroca fe-*



161



162

Fig. 161—162. *Diploposthe laevis* (Bloch, 1782). 161. Scolex with retracted rostellum. 162. Cirrus sac.

rina (L.), *Nyroca rufa* (L.), *Oidemia nigra* (L.), *Oxyura leucocephala* (Scop.), *Querquedula querquedula* (L.), *Spatula clypeata* (L.).

Frequency and time of occurrence as observed by the present author: in three *Nyroca ferina* (L.) out of the six examined (50%)

five to 299 specimens in one host at Drużno Lake in July and August. In thirteen *Nyroca rufa* (L.) out of the 23 examined (56,5%) one to 840 specimens in one host at Drużno Lake in July, August and September. In one *Anser anser dom.* (L.) out of the 230 examined (0.4%) I found two not quite mature specimens of this tapeworm of the District of Gdańsk in August.

Geographical distribution: Europe, Asia (India, Japan, China, Syberia), Africa (Egypt), Australia (Queensland), North America (Schiller, 1951), South America (Wolffhügel, 1920).

Localization: small intestine.

Morphology exhaustively elaborated by a number of writers (see List of References). As I found it the number of testes in the proglottid of one and the same specimen varies from three to seven too often for this feature to be given the significance of a specific feature ascribed by Mathevossian (1942) to it. Very well-developed circular musculature, shown in Fig. 162, is conspicuous in the internal structure of the cirrus sac. Within the collum there are strong muscles a contraction of which makes the scolex seem to pass without a sharp break into a chain of proglottids (Fig. 161). When rectracted the rostellar pouch reaches far beyond the back edges of the suckers which are unarmed and located almost parietally.

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VIII. Conclusions

A. Methodical

1. The tapeworms ought to be removed from the instestine of the host as soon as it is dead. Some species of tapeworms (*Drepanidotaenia przewalskii, Sphenacanthus fasciculata* and others) break into small sections of strobila, in others (*Hymenolepis setigera, Sobolevicanthus gracilis* and others) the scolex gets easily detached within a few score of minutes after the death of the host.

2. Tapeworm eggs ought to be examined fresh in water. Canada Balsam occasions the deformation of their outer shells.

3. A disadvantage of the excellent Blachin method of staining with lactic acid carmine is the corrosive action of lactic acid on small tapeworms. When stained with the Blachin method small tapeworms become frail, extensile, easily stick to the walls of glass vessels and preparation needles, and break. To prevent the undesirable effects of the Blachin method the washed tapeworms ought to be plunged for a short time in alcohol, cleansed in water and only then treated with lactic acid carmine.

4. The material ought at all events to be fixed or stained with the Blachin method without being fixed after the death of the parasites. When they are removed from the intestine and cleansed in water they ought to be kept there till their movements stop. In warm or lukewarm water they perish with their muscles relaxed and then they are fit to be fixed and stained. When they are fixed alive the proglottids are too much contracted and this changes the shape of the strobila and makes the examination of the internal organs difficult.

B. General

5. From the literature and my own studies I made a list of hitherto known 86 *Hymenolepididae* of nine species of *Anseriformes* (see Table I. p.): *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.), *Fuligula fuligula* (L.), *Nettion crecca* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), *Querquedula querquedula* (L.). The list contains 86 tapeworm species including 48 European species and 38 others.

6. In domestic duck — *Anas platyrhynchos dom.* (L.) a smaller

number of tapeworm species (11) and a smaller intensity of invasion were found than in wild duck — *Anas platyrhynchos* (L.), in which I found 16 *Hymenolepididae* species (see Table II, p.). Out of eleven species of domestic duck tapeworms ten were found in *Anas platyrhynchos* (L.), most of them occurring also in other wild duck and sporadically in domestic goose. Hence, wild duck are very likely to spread domestic duck tapeworms.

7. Out of the eleven *Hymenolepididae* species found in *Anser anser dom.* (L.) only four: *Drepanidotaenia lanceolata*, *Drep. przewalskii*, *Hymenolepis setigera* and *Sphenacanthus fasciculata* occurred more often (from 5.6% to 34.3% of the hosts examined). They were parasites of which I could not find a single one in other hosts examined. The other seven tapeworm species were also found in other hosts yet in domestic goose they occurred only sporadically. Hence the conclusion that the danger of the common tapeworms of domestic goose being spread by domestic and wild duck is small.

8. No tapeworms were found in 7.7% *Anas platyrhynchos* (L.), in 49% *Anas platyrhynchos dom.* (L.), in 57.3% *Anser anser dom.* (L.), in 29.5% *Chaulelasmus streperus* (L.), in 28.5% *Nettion crecca* (L.) and in 36.7% *Querquedula querquedula* (L.). *Fuligula fuligula* (L.), *Nyroca ferina* (L.) and *Nyroca rufa* (L.) were invaded with tapeworms in 100%. The relatively high percentage of domestic ducks and geese free from tapeworms can be accounted for by the fact that I examined these animals throughout the year and a distinct decrease in invasion is observed in winter, while the wild birds were examined in spring, summer and early in autumn when the invasion is large.

9. I found new hosts for the following seventeen tapeworm species: 1. *Aploparaksis elisae* (Skrjabin, 1914) in *Nyroca rufa* (L.). 2. *Aploparaksis furcigera* (Rud., 1819) in *Anser anser dom.* (L.). 3. *Diorchis (D.) inflata* (Rud., 1819) in *Nyroca rufa* (L.). 4. *Diorchis nyrocae* Yamaguti, 1935 in *Nyroca rufa* (L.). 5. *Diorchis ransomi* Schultz, 1940 in *Nyroca rufa* (L.). 6. *Dicranotaenia coronula* (Duj., 1845) in *Anser anser dom.* (L.), *Nyroca rufa* (L). and *Querquedula querquedula* (L.). 7. *Drepanidotaenia przewalskii* (Skrj., 1914) in *Anser anser dom.* (L.). 8. *Echinocotyle rosseteri* Blanchard, 1891 in *Querquedula querquedula* (L.). 9. *Hymenolepis arcuata* Kowalewski, 1904 in *Nyroca rufa* (L.). 10. *Hymenolepis compressa* (Linton, 1892) in *Anas platyrhynchos dom.* (L.). 11. *Hymenolepis paramicrosoma* Gąsowska, 1931 in *Anas platyrhynchos*

dom. (L.) and *Nyroca rufa* (L.). 12. *Hymenolepis parvula* Kowalewski, 1904 in *Nyroca rufa* (L.). 13. *Sobolevicanthus gracilis* (Zeder, 1803) in *Nyroca rufa* (L.). 14. *Sobolevicanthus krabbeella* (Hughes, 1940) in *Anas platyrhynchos* (L.). 15. *Sphenacanthus macrocephala* (Fuhr., 1913) in *Nyroca rufa* (L.) and *Nyroca ferina* (L.). 16. *Fimbriaria fasciolaris* (Pallas, 1781) in *Nyroca rufa* (L.). 17. *Diploposthe laevis* (Bloch, 1782) in *Anser anser dom.* (L.).

10. I found the following tapeworm species in Poland for the first time: 1. *Aploparaksis elisae* Skrjabin, 1914; 2. *Diorchis (D.) nyrocae* Yamaguti, 1935; 3. *Diorchis (D.) parvogenitalis* Skrjabin et Mathevossian, 1945; 4. *Diorchis (N.) spinata* Mayhew, 1929; 5. *Drepanidotaenia przewalskii* (Skrjabin, 1914); 6. *Echinozotyle rosseteri* Blanchard, 1891; 7. *Hymenolepis abortiva* (Linstow, 1904); 8. *Hymenolepis teresoides* Fuhrmann, 1906; 9. *Sobolevicanthus bisaccata* (Fuhrmann, 1906); 10. *Sobolevicanthus krabbeella* (Hughes, 1940); 11. *Sobolevicanthus octacantha* (Krabbe, 1869) and 12. *Sphenacanthus macrocephala* (Fuhrmann, 1913).

C. On Variability

11. I divided the features of mature tapeworms on the evidence of the material examined into permanent and plastic, according to in what degree they change. I rank among the permanent features: a. the shape, size and number of rostellar hooks, b. the armature of the suckers, c. the armature, structure and dimensions of the cirrus, d. the structure of eggs, e. the structure and topography of the internal organs as related with other properties, f. the basic character of the structure of the proglottids. The following I regard as plastic features: a. the length and width of the strobila, b. the number of proglottids in mature specimens, c. the appearance of the internal organs in a definite proglottid behind the scolex, d. the size of the uterus and sometimes of the ovary, e. the size and shape of the testes, f. the relation of the length of the cirrus sac to the width of the proglottid. The cirrus sac has a similar absolute size in wide and narrow proglottids showing the same degree of maturity. The measurable permanent features account on the whole for anything between a few and over twenty per cent of the oscillation from the minimum dimensions, while the oscillations of the dimensions of

the plastic features (see points a, b and c) may amount to a few hundred per cent.

12. Misunderstanding due to the ignoring of the state of development and the function of the organs of mature *Hymenolepididae* made me inclined to distinguish the physiologically variable features: a. the relation of the length of the cirrus sac to the width of the proglottid; as a rule the cirrus sac reaches farthest inside the young genital proglottid and nearest inside the young uterus proglottid which is the widest; b. the dimensions of the cirrus sac are physiologically variable and depend on the degree of development and contractility of its musculature and the degree to which the internal seminal vesicle is filled with semen; c. the network stucture of the ovary, conspicuous in the early stages of development becomes effaced in the later stages of development because of the growth of the concreting processes; the ovary then resembles a formation of a compact structure (*Hym. paracompressa* sp. n., *Sobolevicanthus wiśniewskii* sp. n.); d. the shape of the proglottids, and particularly of the antiporal part of the velum, is variable in definite species, e. g., *Hym. arcuata* K o w a l e w s k i, 1904; e. the location of the bottom of the rostellar pouch in relation to the suckers depends on the state of contraction of the musculature of the pouch; f. the shape of the testes in some species depends on their maturity, thus, in *Dicronataenia coronula* (D u j., 1845) the young testes have incisions on their surface, while the mature ones are smooth; g. the size and shape of the seminal vesicles and the seminal receptacle are closely related to the degree to which they are filled with semen and are of no major importance from the point of view of taxonomy.

D. Systematic

13. Having analysed the present systematical conceptions I have arrived at the conclusion that since a number of accurate figures are missing on both the anatomy and the life cycles of many *Hymenolepididae* living in *Anseriformes* none of these conceptions may be accepted in its entirety. I suggest that the generic diagnosis of *Hymenolepis* W e i n l a n d, 1858 sensu lato should for the time being be accpeted for most of the hitherto recorded tritesticular bird tapeworms of the group in question.

14. The following genera containing the species parasiting in

Anseriformes deserve of being excluded from the *Hymenolepis* Weinland, 1858 s. l.: a. *Dicranotaenia* Railliet, 1892 sensu Spassky et Spasskaja, 1954; b. *Drepanidotaenia* Railliet, 1892 sensu Spassky et Spasskaja, 1954; c. *Echinocotyle* Blanchard, 1891; d. *Orlovilepis* Spassky et Spasskaja, 1954; e. *Sobolevicanthus* Spasky et Spasskaja, 1954; f. *Sphenacanthus* Lopez-Neyra, 1942 sensu Spassky et Spasskaja, 1954.

15. I suggest that *Bisaccanthes bisaccata* (Fuhrmann, 1906), the only representative of the genus *Bisaccanthes* Spassky et Spasskaja, 1954, should be included to the genus *Sobolevicanthus* Spassky et Spasskaja, 1954. I assign to this genus also the species *Sob. krabbeella* (Hughes, 1940) n. comb. and the species *Sob. stolli* (Brock, 1941) n. comb. Neither is there any reason for creating a separate species for *Tschertkovilepis setigera* (Frölich, 1789), the only representative of the genus *Tschertkovilepis* Spassky et Spasskaja, 1954 and consequently I assign this species to the genus *Hymenolepis* Weinl., 1858 s. l.

16. Five new species were described in part VII: a. *Diorchis (D.) stefańskii* sp. n. in *Anas platyrhynchos* (L.), *Anas platyrhynchos dom* (L.), *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.) and *Nyroca rufa* (L.); b. *Diorchis* (*N?*) *danutae* sp. n. in *Nyroca rufa* (L.); c. *Hymenolepis paracompressa* sp. n. in *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser anser dom.* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.) and *Querquedula querquedula* (L.); d. *Hymenolepis spiralibursata* sp. n. in *Anas platyrhynchos* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.) and *Querquedula querquedula* (L.); e. *Sobolevicanthus wiśniewskii* sp. n. in *Nyroca ferina* (L.) and *Nyroca rufa* (L.).

17. The following tapeworm species I regard as synonyms of forms formerly described: 1. *Aploparaksis pseudofurcigera* Skrjabin et Mathevossian, 1945 as a synonym of *Aploparaksis furcigera* (Rudolphi, 1819); 2. *Dicranotaenia coronula micracantha* Skrjabin et Mathevossian, 1945, *Dicranotaenia pseudocoronula* Skrjabin et Mathevossian, 1945, *Weinlandia macrostrobilodes* Mayhew, 1925, *Weinlandia introversa* Mayhew, 1925, *Hymenolepis mergi* Yamaguti, 1940, *Hymenolepis apcaris* Sharma, 1943 — all as synonyms of *Dicranotaenia*

coronula (Dujardin, 1845); 3. *Drepanidotaenia lobata* (Szpotańska, 1931), Skrjabin et Mathevossian, 1945 as a synonym of *Drepanidotaenia lanceolata* (Bloch, 1782); 4. *Hymenolepis globulosa* Szpotańska, 1931 as a synonym of *Hymenolepis teresoides* Fuhrmann, 1906; 5. *Hymenolepis villosoides* Solowiow, 1911 as a synonym of *Hymenolepis arcuata* Kowalewski, 1904.

18. I confirm the opinion of Spassky & Spasskaja (1954) that *Hymenolepis parvisaccata* Shepard, 1943 is a synonym of *Dicranotaenia coronula* (Duj., 1845), while *Hymenolepis anseris* Skrjabin et Mathevossian, 1942 a synonym of *Hymenolepis setigera* (Frölich, 1789).

19. I think it proper to make a more accurate anatomical examination of the following tapeworms the specific distinction of which may be objected to: 1. *Hymenolepis rarus* Skrjabin, 1914 — a synonym of *Hymenolepis teresoides* Fuhrmann, 1906?; 2. *Fuhrmanniella fausti* Tseng Shen, 1932 — a synonym of *Hymenolepis paramicrosoma* Gąsowska, 1931?; 3. *Hymenolepis collaris* (Batsch, 1786) — was it not described on the evidence of a *Sobolevicanthus gracilis* (Zeder, 1803) strobila and of a *Hymenolepis compressa* (Linstow, 1892) scolex? (only eggs of this species differ from those of *Sobol. gracilis*); 4. *Diorchis (N.) acuminata* (Clerc, 1902) — may *Diorchis (D.) ransomi* Schultz, 1940 be regarded as one of the synonyms of this species?

20. In Part VII I have presented the synonyms of the tapeworms, the hosts hitherto recorded, the time and frequency of occurrence as observed by the present author, the geographical distribution, the location and a summary of references to the thirty-four *Hymenolepididae* species found by the present author. For most of these species I give supplementary descriptions of little known or unknown anatomical details and original illustrations. I do not discuss the morphology of only four species: *Diorchis (D.) parvogenitalis* Skrjabin et Mathevossian, 1945, *Hymenolepis anatina* (Krabbe, 1869), *Sphenacanthus fasciculata* (Ransom, 1909) and *Fimbriaria fasciolaris* (Pallas, 1781).

Author's Address:
Zakład Parazytologii P. A. N.
Warszawa, Pasteura 3

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ABBREVIATIONS

a.g. — atrium genitale.
b.c. — bursa cirri.
c. — cirrus.
c.e.l.d. — canalis excretorius longitudinalis dorsalis.
c.e.l.v. — canalis excretorius longitudinalis ventralis.
c.e.tr. — canalis excretorius transversalis.
gl.M. — glandula Mehlisi.
gl. vit. — glandula vitellina.
m.l.e. — musculi longitudinales externi.
m.l.i. — musculi longitudinales interni.
ov. — ovarium.
p.c.v. — pars copulatrix vaginae.
p.g.f. — porus genitalis femininus.
p.g.m. — porus genitalis masculinus.
p.i.v. — pars intermedia vaginae.
r.s. — receptaculum seminis.
s.a.e. — sacculus accessorius externus.
s.a.i. — sacculus accessorius internus.
t. — testis.
ut. — uterus.
v. — vagina.
v.d. — vas defferens.
v.e. — vas efferens.
v.s.e. — vesicula seminalis externa.
v.s.i. — visicula seminalis interna.

STRESZCZENIE

Przedmiotem pracy jest głównie anatomia i systematyka tasiemców z rodziny *Hymenolepididae*, znalezionych u *Anseriformes* domowych i dzikich w Polsce.

Praca opiera się na materiale obejmującym 41172 okazów tasiemców, które znalazłem u 468 ptaków należących do 12 gatunków z rzędu blaszkodziobych: *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.), *Fuligula fuligula* (L.), *Nettion crecca* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), *Querquedula querquedula* (L.), *Dafila acuta* (L.), *Glaucionetta clangula* (L.) i *Mergus merganser* L. Trzy ostatnio wymienione gatunki ptaków zbadane były po jednym osobniku i nie wykazały obecności tasiemców. Większość okazów tasiemców pochodziła ze 116 kaczek dzikich upolowanych na jez. Drużno (Mazury) w ramach pracy zespołowej nad krążeniem pasożytów w biocenozie tego jeziora. Pozostały materiał zebrałem z 352 żywicieli w tym z 22 kaczek dzikich okolic Warszawy, Radomia i Białegostoku, ze 100 kaczek domowych i 230 gęsi domowych poddawanych ubojowi w rzeźniach Lublina, Zamościa, Torunia i Gdańska.

U wszystkich zbadanych żywicieli stwierdziłem 34 gatunki tasiemców (patrz tabela II).

Spośród wymienionych gatunków pięć uważam, na podstawie dostępnej mi literatury, za nowe dla wiedzy oraz podaję w części szczegółowej ich dokładny opis i rysunki.

Stosowana metodyka, rozważania ogólne i systematyczne doprowadziły mnie do następujących wniosków:

A. Wnioski metodyczne

1. Tasiemce należy wydobywać z jelita żywiciela natychmiast po jego śmierci. Niektóre gatunki tasiemców (*Drepanidotaenia przewalskii, Sphenacanthus fasciculata* i inn.) rozrywają się na drobne odcinki strobil, u innych (*Hymenolepis setigera, Sobolevicanthus*

gracilis i inn.) z łatwością odrywa się skoleks już w kilkadziesiąt minut po śmierci żywiciela.

2. Jaja tasiemców należy badać na świeżo w wodzie. Balsam kanadyjski powoduje odkształcenia osłonek zewnętrznych.

3. Wadą doskonałej metody barwienia karminem kwasomlekowym wg Blachina jest trawiące działanie kwasu mlekowego na tasiemce drobne. Barwione według przepisu Blachina małe tasiemce stają się wiotkie, rozciągliwe, z łatwością przyklejają się do ścianek naczyń szklanych, igiełek preparacyjnych i rozrywają się. Krótkie zanurzenie przemytych tasiemców w alkoholu, następnie przepłukanie ich w wodzie i dopiero wówczas potraktowanie ich karminem kwasomlekowym zapobiega ujemnym skutkom stosowania metody Blachina.

4. Konserwowanie materiału lub barwienie go metodą Blachina bez konserwacji winno odbywać się bezwzględnie po śmierci pasożytów. Po wyjęciu pasożytów z jelita i przepłukaniu ich w wodzie należy trzymać je tam tak długo, aż ustaną ich ruchy. W ciepłej lub letniej wodzie płazińce giną w stanie rozkurczu mięśni i wówczas nadają się dobrze do utrwalania i barwienia. Utrwalanie przyżyciowe wywołuje zbytnią kontrakcję członów, co zmienia kształt strobili i utrudnia badanie narządów wewnętrznych.

B. Wnioski ogólne

5. Na podstawie danych z literatury i badań własnych sporządziłem wykaz dotychczas znanych *Hymenolepididae* z 9 gatunków *Anseriformes* (p. tabela I): *Anas plarythynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.), *Fuligula fuligula* (L.), *Nettion crecca* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.) i *Querquedula querquedula* (L.). Wykaz obejmuje 86 gatunków tasiemców, w tej liczbie 48 gatunków europejskich i 38 pozaeuropejskich.

6. U kaczek domowych — *Anas platyrhynchos dom.* (L.) — stwierdzam mniejszą liczbę gatunków tasiemców (11) i mniejsze nasilenie inwazji niż u krzyżówek — *Anas platyrhynchos* (L.), u których znalazłem 16 gatunków *Hymenolepididae* (p. tabela II). Spośród 11 gatunków tasiemców kaczki domowej 10 znajdowałem u *Anas platyrhynchos*, w tej liczbie większość występowała także u innych żywicieli dzikich i sporadycznie u gęsi domowych. Wynika

stąd, że możliwość rozpowszechniania tasiemców kaczki domowej przez kaczki dzikie jest duża.

7. Spośród 11 gatunków *Hymenolepididae* znalezionych u *Anser anser dom.* (L.) tylko 4: *Drepanidotaenia lanceolata, Drep. przewalskii, Hymenolepis setigera* i *Sphenacanthus fasciculata* występowały częściej (od 5,6 % do 34,3 % zbadanych żywicieli). Są to pasożyty, których nie znalazłem ani razu u żadnego innego spośród zbadanych żywicieli. Pozostałe 7 gatunków tasiemców znajdowałem także u innych żywicieli, lecz u gęsi domowej występowały one tylko sporadycznie. Stąd wnioskuję, że niebezpieczeństwo roznoszenia pospolitych tasiemców gęsi domowej przez kaczki domowe i dzikie jest niewielkie.

8. Tasiemców nie znalazłem: u 7,7 % *Anas platyrhynchos* (L.), u 49 % *Anas plat. dom.* (L.), u 57,3 % *Anser anser dom.* (L.), u 28,5 % *Chaulelasmus streperus* (L.), u 28,5 % *Nettion crecca* (L.) i u 35,7 % *Querquedula querquedula* (L.). *Fuligula fuligula* (L.), *Nyroca ferina* (L.) *i Nyroca rufa* (L.) były zarobaczone przez tasiemce w 100 %. Wysoki stosunkowo procent kaczek i gęsi domowych wolnych od tasiemców można wytłumaczyć tym, że zwierzęta te badałem przez cały rok dostrzegając wyraźny spadek inwazji w zimie. Natomiast ptaki dzikie były badane prawie wyłącznie na wiosnę, w lecie i wczesną jesienią, kiedy zarobaczenie utrzymuje się na wysokim poziomie.

9. Dla następujących 17 gatunków tasiemców stwierdzam pierwszy raz nowych żywicieli: 1. *Aploparaksis elisae* (Skrjabin, 1914) u *Nyroca rufa* (L.). 2. *Aploparaksis furcigera* (Rud., 1819) u *Anser anser dom.* (L.). 3. *Diorchis* (*D.*) *inflata* (Rud., 1819) u *Nyroca rufa* (L.). 4. *Diorchis nyrocae* Yamaguti, 1935 u *Nyroca rufa* (L.). 5. *Diorchis ransomi* Schultz, 1940 u *Nyroca rufa* (L.). 6. *Dicranolepis arcuata* Kowalewski, 1904 u *Nyroca rufa* (L.). 10. *Hymerufa* (L.) i *Querquedula querquedula* (L.). 7. *Drepanidotaenia przewalskii* (Skrj., 1914) u *Anser anser dom.* (L.). 8. *Echinocotyle rosseteri* Blanchard, 1891 u *Querquedula querquedula* (L.). 9. *Hymenolepis arcuata* Kowalewski, 1904 *u Nyroca rufa* (L.). *10. Hymenolepis compressa* (Linton, 1892) u *Anas platyrhynchos dom.* (L.). 11. *Hymenolepis paramicrosoma* Gąsowska, 1931 u *Anas platyrhynchos dom.* (L.) i *Nyroca rufa* (L.). 12. *Hymenolepis parvula* Kowalewski, 1904 u *Nyroca rufa* (L.). 13. *Sobolevicanthus gracilis* (Zeder, 1803) u *Nyroca rufa* (L.). 14. *Sobolevicanthus Krabbeella* (Hughes, 1940) u *Anas platyrhynchos* (L.). 15. *Sphen-*

acanthus macrocephala (Fuhrm., 1913) u *Nyroca rufa* (L.) i *Nyroca ferina* (L.). 16. *Fimbriaria fasciolaris* (Pallas, 1781) u *Nyroca rufa* (L.). 17. *Diploposthe laevis* (Bloch, 1782) u *Anser anser dom.* (L.).

10. Następujące gatunki tasiemców stwierdzam pierwszy raz na terenie Polski: 1. *Aploparaksis elisae* Skrjabin, 1914, 2. *Diorchis (D.) nyrocae* Yamaguti, 1935, 3. *Diorchis (D.) parvogenitalis* Skrjabin et Mathevossian, 1945, 4. *Diorchis (N.) spinata* Mayhew, 1929, 5. *Drepanidotaenia przewalskii* (Skrjabin, 1914), 6. *Echinocotyle rosseteri* Blanchard, 1891, 7. *Hymenolepis abortiva* (Linstow, 1904), 8. *Hymenolepis teresoides* Fuhrmann, 1906, 9. *Sobolevicanthus bisaccata* (Fuhrmann, 1906), 10. *Sobolevicanthus krabbeella* (Hughes, 1940), 11. *Sobolevicanthus octacantha* (Krabbe, 1869) i 12. *Sphenacanthus macrocephala* (Fuhrmann, 1913).

C. Wnioski dotyczące zmienności

11. W zależności od stopnia zmienności podzieliłem cechy dojrzałych tasiemców na podstawie zbadanego materiału na cechy trwałe i plastyczne. Do cech trwałych zaliczam: a) kształt, wielkość i liczbę haków ryjkowych, b) uzbrojenie przyssawek, c) uzbrojenie, struktura i rozmiary cirrusa, d) budowa jaj, e) budowa i topografia narządów wewnętrznych w zespole innych właściwości, f) zasadniczy charakter budowy członów. Za cechy plastyczne uważam: a) długość i szerokość strobili, b) liczbę członów osobników dojrzałych, c) pojawianie się narządów wewnętrznych w określonym członie ze skoleksem, d) wielkość macicy i niekiedy jajnika, e) wielkość i kształt jąder, f) stosunek długości torebki prąciowej do szerokości członu. Torebka prąciowa zachowuje podobną bezwzględną wielkość w członach szerokich i wąskich wykazujących ten sam stopień dojrzałości. Dające się zmierzyć cechy konserwatywne nie przekraczają na ogół kilku do dwudziestu kilku procent wahań od wymiarów minimalnych, natomiast wahania wymiarów cech plastycznych (patrz a, b i c) mogą osiągnąć kilkaset procent.

12. Nieporozumienia wynikające z niedoceniania stanu wzrostu, rozwoju i funkcji narządów dojrzałych *Hymenolepididae* skłoniły mnie do wyodrębnienia cech fizjologicznie zmiennych: a) stosunek długości torebki prąciowej do szerokości członu — torebka prąciowa

sięga z reguły najdalej wgłąb członu młodego i najbliżej wgłąb członu macicznego młodego, który jest najszerszy; b) rozmiary torebki prąciowej są fizjologicznie zmienne w zależności od stopnia wykształcenia i kurczliwości jej umięśnienia i stanu wypełnienia spermą pęcherzyka nasiennego wewnętrznego; c) siatkowata struktura jajnika dobrze widoczna we wczesnych stadiach rozwoju zaciera się w dalszych stadiach na skutek wzrostu łączących się ze sobą wyrostków; jajnik przypomina wówczas twór o budowie zbitej (*Hym. paracompressa* sp. n., *Sobolevicanthus wiśniewskii* sp. n.); d) kształt członów, w szczególności antyporalnej części żagielka (velum) jest zmienny u określonych gatunków np. *Hym. arcuata* Kowalewski, 1904; e) położenie dna pochewki ryjkowej w stosunku do przyssawek zależy od stanu skurczu umięśnienia pochewki; f) kształt jąder niektórych gatunków zmienia się w zależności od stopnia ich dojrzałości, np. u *Dicranotaenia coronula* (Duj., 1845) młode jądra mają wcięcia na powierzchni, dojrzałe zaś są gładkie; g) wielkość i kształt pęcherzyków nasiennych i zbiornika nasiennego są ściśle związane ze stanem ich wypełnienia przez nasienie i nie mają większego znaczenia dla taksonomii.

D. Wnioski systematyczne

13. Po przeanalizowaniu dotychczasowych koncepcji systematycznych doszedłem do przekonania, że brak szeregu danych szczegółowych dotyczących zarówno anatomii jak i cyklów życiowych wielu *Hymenolepididae* bytujących u *Anseriformes* nie pozwala na przyjęcie żadnej z tych koncepcji w całej rozciągłości. Proponuję tymczasowe przyjęcie diagnozy rodzajowej *Hymenolepis* Weinland, 1858 sensu lato dla większości dotychczas znanych trzyjądrowych ptasich tasiemców omawianej grupy.

14. Na wyłączenie z rodzaju *Hymenolepis* Weinland, 1858 s. l. zasługują następujące rodzaje obejmujące gatunki pasożytujące u *Anseriformes:* a) *Dicranotaenia* Railliet, 1892 sensu Spassky et Spasskaja, 1954, b) *Drepanidotaenia* Railliet, 1892 sensu Spassky et Spasskaja, 1954, c) *Echinocotyle* Blanchard, 1891, d) *Orlovilepis* Spassky et Spasskaja, 1954, e) *Sobolevicanthus* Spassky et Spasskaja, 1954 i f) *Sphenacanthus* Lopez-Neyra, 1942 sensu Spassky et Spasskaja, 1954.

15. Jedynego przedstawiciela rodzaju *Bisaccanthes* Spassky

et Spasskaja, 1954 — *Bisacc. bisaccata* (Fuhrmann, 1906) proponuję włączyć do rodzaju *Sobolevicanthus* Spassky et Spasskaja, 1954. Do tego rodzaju zaliczam także gatunek *Sob. krabbeella* (Hughes, 1940) n. comb. oraz gatunek *Sob. stolli* (Brock, 1941) n. comb. Również jedyny przedstawiciel rodzaju *Tschertkovilepis* Spassky et Spasskaja, 1954 — *Tsch. setigera* (Frölich, 1789) nie uzasadnia potrzeby stworzenia dla niego odrębnego rodzaju i dlatego gatunek ten zaliczam do rodzaju *Hymenolepis* Weinl., 1858 s. l.

16. W części szczegółowej opisuję 5 nowych gatunków: a) *Diorchis (D.) stefańskii* sp. n. u *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.) i *Nyroca rufa* (L.); b) *Diorchis (N?) danutae* sp. n. u *Nyroca rufa* (L.); c) *Hymenolepis paracompressa* sp. n. u *Anas plat.* (L.), *Anas plat. dom.* (L.), *Anser anser dom.* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.) i *Querquedula querquedula* (L.); d) *Hymenolepis spiralibursata* sp. n. u *Anas plat.* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.) i *Querquedula querquedula* (L.); e) *Sobolevicanthus wiśniewskii* sp. n. u *Nyroca ferina* (L.) i *Nyroca rufa* (L.).

17. Następujące gatunki tasiemców uważam za synonimy poprzednio opisanych form: 1. *Aploparaksis pseudofurcigera* Skrjabin et Mathevossian, 1945 — jako synonim *Aploparaksis furcigera* (Rudolphi, 1819). 2. *Dicranotaenia coronula micracantha* Skrjabin et Mathevossian, 1945, *Dicranotaenia pseudocoronula* Skrjabin et Mathevossian, 1954, *Weinlandia macrostrobilodes* Mayhew, 1925, *Weinlandia introversa* Mayhew, 1925, *Hymenolepis mergi* Yamaguti, 1940, *Hymenolepis apcaris* Sharma, 1943 jako synonimy *Dicranotaenia coronula* (Dujardin, 1845). 3. *Drepanidotaenia lobata* (Szpotańska, 1931) Skrjabin et Mathevossian, 1945 — jako synonim *Drepanidotaenia lanceolata* (Bloch, 1782). 4. *Hymenolepis globulosa* Szpotańska, 1931 — jako synonim *Hymenolepis teresoides* Fuhrmann, 1906. 5. *Hymenolepis villosoides* Solowiow, 1911 — jako synonim *Hymenolepis arcuata* Kowalewski, 1904.

18. Potwierdzam opinię Spasskiego i Spasskiej (1954), że *Hymenolepis parvisaccata* Shepard, 1943 jest synonimem *Dicranotaenia coronula* (Duj., 1845) a *Hymenolepis anseris* Skrjabin et Mathevossian, 1942 — synonimem *Hymenolepis setigera* (Frölich, 1789).

19. Uważam za wskazane przeprowadzić dokładniejsze badania anatomiczne następujących tasiemców, których odrębność gatunkowa budzi zastrzeżenia: 1. *Hymenolepis rarus* Skrjabin, 1914 (być może synonim *Hymenolepis teresoides* Fuhrmann, 1906); 2. *Fuhrmanniella fausti* Tseng Shen, 1932 (być może synonim *Hymenolepis paramicrosoma* Gąsowska, 1931); 3. *Hymenolepis collaris* (Batsch, 1786) — czy nie został opisany na podstawie strobili *Sobolevicanthus gracilis* (Zeder, 1803) i skoleksa *Hymenolepis compressa* (Linstow, 1892) (jedynie jaja tego gatunku różnią się od jaj *Sobol. gracilis*); 4. *Diorchis (N.) acuminata* (Clerc, 1902) (czy *Diorchis (D.) ransomi* Schultz, 1940 można zaliczyć do synonimów tego gatunku).

20. W części szczegółowej podaję synonimikę tasiemców dotychczas poznanych żywicieli, częstość i czas występowania według badań własnych, rozmieszczenie geograficzne, umiejscowienie i skrót literatury dotyczącej 34 znalezionych przeze mnie gatunków *Hymenolepididae*. W stosunku do większości tych gatunków podaję uzupełniające opisy mało znanych lub nieznanych szczegółów anatomicznych oraz oryginalne ilustracje. Nie poruszam morfologii jedynie 4 gatunków: *Diorchis (D.) parvogenitalis* Skrjabin et Matevossian, 1945, *Hymenolepis anatina* (Krabbe, 1869), *Sphenacanthus fasciculata* (Ransom, 1909) i *Fimbriaria fasciolaris* (Pallas, 1781).

РЕЗЮМЕ

Предметом работы является, главным образом, анатомия и систематика ленточных червей из семейства *Hymenolepididae*, найденых в Польше у домашних и диких *Anseriformes*.

Работа базируется на материале, состоящем из 41172 экземпляров ленточных червей, обнаруженных у 468 птиц, принадлежащих к 12 видам из отряда гусеобразных: *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.), *Fuligula fuligula* (L.), *Nettion crecca* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), *Querquedula querquedula* (L.), *Dafila acuta* (L.), *Glaucionetta clangula* (L.) i *Mergus merganser* L. Три последние виды были исследованы по одной особи причем ленточных червей у них не выявлено.

Большинство экземпляров ленточных червей было побрано у 116 диких уток, добытых на озере Дружно на Мазурах, в рамах коллективной работы по циркуляции паразитов в биоценозе названного озера. Остальной материал собран из 352 хозяев, в том числе из 22 диких уток в окрестностях Варшавы, Радома и Белостока; из 100 домашних уток и 230 домашних гусей, забитых на бойнях Люблина, Замостя, Торуня и Гданьска.

У всех исследованных хозяев констатировано 34 вида ленточных червей (см. таб. II).

Пять из числа этих видов я считаю, на основании доступной мне литературы, неизвестными до сих пор науке и даю в специальной части их подробное описание и рисунки. Методика, которой я пользовался, как и общие умозаключения и систематика привели меня к следующим выводам.

A. Методические выводы

1. Ленточных червей необходимо извлекать из кишечника хозяина немедленно после его смерти. Уже спустя несколько десятков минут после наступления таковой у некоторых видов этих червей (*Drepanidotaenia przewalskii, Sphenacanthus fasciculata*

и других) рвутся на мелкие части стробилы, у иных же (*Hymenolepis setigera, Sobolevicanthus gracilis* и других) легко отрывается сколекс.

2. Яйца ленточных червей надо исследовать безотлагательно в воде. Канадский бальзам вызывает деформацию наружных оболочек.

3. Недостатком прекрасного метода окрашивания молочно-кислотным кармином по Бляхину является разлагающее действие молочной кислоты на мелких ленточных червей. Окрашиваемые по методу Бляхина они становятся вялыми, растяжимыми и легко приклеиваются к стенкам стеклянных сосудов и к препараторным иголкам а кроме того рвутся. Погружение на короткое время промытых ленточных червей в алкоголь, с последующим полосканием в воде и окрашиванием молочно-кислотным кармином только после этого, предохраняет их против отрицательных последствий метода Бляхина.

4. Консервирование материала или окрашивание его по методу Бляхина без консервации должно происходить безусловно после смерти паразитов. После извлечения паразитов из кишечника и прополоскания их в воде следует оставит их в ней до того времени пока не прекратятся их движения. В теплой либо тепловатой воде у плоских червей наступает одновременно с гибелью дилатация мышц и в этом состоянии удобно из фиксировать и окрашивать. Фиксирование в живом состоянии вызывает слишком сильную контракцию члеников, что изменяет форму стробилы и затрудняет исследование внутренних органов.

Б. Общие выводы

5. На основе литературных данных и собственных исследований, мною составлен перечень известных доныне 86 *Hymenolepididae* из 9 видов *Anseriformes* (см. табель № I): *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.), *Fuligula fuligula* (L.), *Nettion crecca* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.), *Querquedula querquedula* (L.). Перечень сореджит 86 видов ленточных червей, в том 48 европейских видов и 38 внеевропейских.

6. У домашних уток выявлено значительно меньше видов ленточных червей (11) и меньшую интенсивность инвазии, чем

у крякв *Anas platyrhynchos* (L.), у которых найдено 16 видов *Hymenolepididae* (см. табель № II). Из 11 видов ленточных червей домашней утки 10 обнаружено у *Anas platyrhynchos* (L.), причем большинство их находилось и у иных диких хозяев, а спорадически у домашнего гуся. Явствует отсюда, что возможность распространения ленточных червей домашней утки утками дикими очень возможна.

7. Из 11 видов *Hymenolepididae* обнаруженных у *Anser anser dom.* (L.) только 4: *Drepanidotaenia lanceolata, Drep. przewalskii, Hymenolepis setigera* и *Sphenacanthus fasciculata* выступала чаще (от 5,6% до 34,3% исследованных хозяев). Они являются паразитами, которых я не нашел ни разу ни у одного исследованного хозяина. Остальные 7 видов ленточных червей я обнаруживал также у других хозяев, но у домашнего гуся выступали они только спорадически. Отсюда вывод, что опасность переноса домашними и дикими утками обыкновенных ленточных червей домашнего гуся очень проблематична.

8. Не найдено ленточных червей у: 7,7% *Anas plat.* (L.), 49% *Anas plat. dom.* (L.), 57,3% *Anser anser dom.* (L.), 28,5% *Chaulelasmus streperus* (L.), 28,5% *Nettion crecca* (L.) и 35,7% *Querquedula querquedula* (L.).*Fuliqula fuligula* (L.), *Nyroca ferina* (L.) и *Nyroca rufa* (L.) были заражены ленточными червями на 100%. Сравнительно высокий процент домашних уток и гусей, у которых не было ленточных червей можно объяснить тем, что эти животные исследовались в течение целого года, причем наблюдалось заметное ослабление инвазии зимой, в то время как дикие животные были исследованы исключительно весной, летом и ранней осенью, когда инвазия находится на высоком уровне.

9. Для следующих 17 видов ленточных червей выявлены впервые новые хозяева: 1. *Aploparaksis elisae* (Skrjabin, 1914) у *Nyroca rufa* (L.), 2. *Aploparaksis furcigera* (Rud., 1819) у *Anser anser dom.* (L.), 3. *Diorchis* (*D.*) *inflata* (Rud., 1819) у *Nyroca rufa* (L.), 4. *Diorchis* (*D.*) *nyrocae* Yamaguti, 1935 у *Nyroca rufa* (L.), 5. *Diorchis* (*D.*) *ransomi* Schultz, 1940 у *Nyroca rufa* (L.), 6. *Dicranotaenia coronula* (Duj., 1845) у *Anser anser dom.* (L.), *Nyroca rufa* (L.) и *Querquedula querquedula* (L.), 7. *Drepanidotaenia przewalskii* (Skrjabin, 1914) у *Anser anser dom.* (L.). 8. *Echinocotyle rosseteri* Blanchard, 1891 у *Querquedula querquedula* (L.), 9. *Hymenolepis arcuata* Kowalewski, 1904 у *Nyroca rufa* (L.). 10. *Hymenolepis compressa* (Linton, 1892) у *Anas*

platyrhynchos dom. (L.). 11. *Hymenolepis paramicrosoma* Gąsowska, 1931 у *Anas platyrhynchros dom.* (L.) и *Nyroca rufa* (L.). 12. *Hymenolepis parvula* Kowalewski, 1904 у *Nyroca rufa* (L.). 13. *Sobolevicanthus gracilis* (Zeder, 1803) у *Nyroca rufa* (L.). 14. *Sobolecicanthus krabbeella* (Hughes, 1940) у *Anas platyrhynchos* (L.). 15. *Sphenacanthus macrocephala* (Fuhrm., 1913) у *Nyroca rufa* (L.) и *Nyroca ferina* (L.). 16. *Fimbriaria fasciolaris* (Pallas, 1781) у *Nyroca rufa* (L.). 17. *Diploposthe laevis* (Bloch, 1782) у *Anser anser dom.* (L).

10. Обнаружены впервые на территории Польши следующие виды ленточных червей: 1. *Aploparaksis elisae,* Skrjabin, 1914, 2. *Diorchis* (*D.*) *nyrocae* Yamaguti, 1935, 3. *Diorchis parvogenitalis* Skrjabin et Mathevossian, 1945, 4. *Diorchis* (*N.*) *spinata* Mayhew, 1929, 5. *Drepanidotaenia przewalskii* (Skrjabin, 1914), 6. *Echinocotyle rosseteri* Blanchard, 1891, 7. *Hymenolepis abortiva* (Linstow, 1904), 8. *Hymenolepis teresoides* (Fuhrmann, 1906), 9. *Sobolevicanthus bisaccata* (Fuhrmann, 1906), 10. *Sobolevicanthus krabbeella* (Hughes, 1940), 11. *Sobolevicanthus octacantha* (Krabbe, 1869 и 12. *Sphenacanthus macrocephala* (Fuhrmann, 1913).

B. Выводы касающиеся изменчивости

11. В зависимости от степени изменчивости разделены, на основании исследованного материала, черты зрелых ленточных червей на постоянные и пластические. К постоянным чертам причислены: a. форма, величина и число хоботковых крючков; b. вооружение присосок; c. вооружение, структура и размеры цирруса; d. строение яиц; e. строение и топография внутренних органов в комплексе прочих свойств; f. основной характер строения члеников. Чертами пластическими считаю: a. длину и ширину стробилы; b. число члеников у зрелых особей; c. появление внутренних органов в определенном членике за сколеском; d. величину яичника и матки; e. размеры и форму семенников; f. соотношение между длиной половой бурсы и между шириной членика, не являющимся прямо пропорциональным. Половая бурса сохраняет ту же безотносительную величину в широких и узких члениках той же зрелости. Отклонение измеримых постоянных черт (напр. длины) от минимальных размеров колеблется обычно в пределах от нескольких до двадцати с лишком про-

центов, тогда как колебания размеров пластических черт (см. a, b и c) достигают нескольких сот процентов.

12. Недорозумения, возникающие вследствие недоценки степени роста, развития и функции зрелых органов *Hymenolepididae* заставили меня выделить физиологически изменчивые черты: a. отношение длины половой бурсы к ширине членика — половая бурса идет обычно дальше вглубь молодого полового членика и недалеко вглубь молодого маточного членика, самого широкого; b. размеры половой бурсы физилогически изменчивы в зависимости от степени оформления и сокращаемости мышц, а также от степени выполнения спермой внутреннего семенного пузырька; c. сетчатая структура яичника, хорошо видимая в ранних стадиях развития, становится в дальнейших стадиях развития менее отчетливой, так как соединяющиеся друг с другом отростки разрастаются, вследствие чего кажется, что структура яичника компактна (*Hym. paracompressa* sp. n., *Sobolevicanthus wiśniewskii* sp. n.); d. форма члеников, в особенности антипоральной части паруса, изменчива у определенных видов, напр. у *Hym. arcuata* K o w a l e w s k i, 1904; e. положение основы хоботкового влагалища в отношени присосок зависит от степени сокращения мышц влагалища; f. форма семенников некоторых видов изменяется в зависимости от степени их зрелости, напр. у *Dicranotaenia coronula* (D u j., 1845) на несозрелых еще семенниках есть углубления, в то время как в зрелых семенниках поверхность гладкая; g. величина и форма семенных пузырьков и семяприемника тесно связаны со степенью выполнения их семенем и не имеют существенного значения для таксономии.

Г. Выводы по систематике

13. Проанализировав существующие концепции по систематике, я убедился, что недостаток ряда подробных данных, касающихся равно анатомии, как и жизненных циклов многих *Hymenolipididae* бытующих у *Anseriformes* не позволяют принять любой концепции во всем ее объеме. Предлагаю принять временно родовой диагноз *Hymenolepis* W e i n l a n d, 1858 s. l. для большинства известных до сих пор птичьих ленточных червей с тремя семенниками обсуждаемой группы.

14. Из рода *Hymenolepis* W e i n l a n d, 1858, s. l. следовало бы

изъять следующие роды, заключающие паразитирующих у *Anseriformes* видов: a. *Dicranotaenia* Railliet, 1892 sensu Spassky et Spasskaja, 1954, b. *Drepanidotaenia* Railliet, 1892, sensu Spassky et Spasskaja, 1954, c. *Echinocotyle* Blanchard, 1891, d. *Orlovilepis* Spassky et Spasskaja, 1954, e. *Sobolevicanthus* Spassky et Spasskaja, 1954, f. *Sphenacanthus* Lopez-Neyra, 1942 sensu Spassky et Spasskaja, 1954.

15. Единственного представителя рода *Bisaccanthes* Spassky et Spasskaja, 1954 — *B. bisaccata* (Fuhrmann, 1906) предлагаю включить в род *Sobolevicanthus* Spassky et Spasskaja, 1954. К этому роду я причисляю также вид *Sob. krabbeella* (Hughes, 1940) n. comb. Точно также единственный представитель рода *Tscherkovilepis* Spassky et Spasskaja, 1954 — *Tsch. setigera* (Frölich, 1789) не оправдывает необходимости создания для него особого рода и поэтому я присоединяю его к роду *Hymenolepis* Weinland, 1858 s. l.

16. В специальной части мною описаны 5 новых видов: a. *Diorchis (D.) stefańskii* sp. n. у *Anas platyrhynchos* (L.), *Anas platyrhynchos dom.* (L.), *Anser anser dom.* (L.), *Chaulelasmus streperus* (L.) и *Nyroca rufa* (L.); b. *Diorchis (N?) danutae* sp. n. у *Nyroca rufa* (L.); c. *Hymenolepis paracompressa* sp. n. у *Anas plat.* (L.), *Anas plat. dom.* (L.), *Anser anser dom.* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.) и *Querquedula querquedula* (L.); d. *Hymenolepis spiralibursata* sp. n. у *Anas plat.* (L.), *Nyroca ferina* (L.), *Nyroca rufa* (L.) и *Querquedula querquedula* (L.); e. *Sobolevicanthus wiśniewskii sp.* n. у *Nyroca ferina* (L.) и *Nyroca rufa* (L.).

17. Следующие виды ленточных червей считаю синонимами прежде описанных форм: 1. *Aploparaksis pseudofurcigera* Skrjabin et Mathevossian, 1945 — синоним *Aploparaksis furcigera* (Rudolphi, 1819); 2. *Dicranotaenia coronula micracantha* Skrjabin et Mathevossian, 1945, *Dicranotaenia pseudocoronula* Skrjabin et Mathevossian, 1945, *Weinlandia macrostobilodes* Mayhew, 1925, *Weinlandia introversa* Mayhew, 1925, *Hymenolepis mergi* Yamaguti 1940, *Hymenolepis apcaris* Sharma, 1943 — синонимы *Dicranotaenia coronula* (Dujardin, 1845); 3. *Drepanidotaenia lobata* (Szpotańska, 1931) Skrjabin et Mathevossian, 1945 — синоним *Drepanidotaenia lanceolata* (Bloch, 1789); 4. *Hymeno-*

lepis globulosa Szpotańska, 1931 — синоним *Hymenolepis teresoides* Fuhrmann, 1906; 5. *Hymenolepis villosoides* Solowiow, 1911 — синоним *Hymenolepis arcuata* Kowalewski, 1904.

18. Соглашаюсь с мнением Спасского и Спасской (1954), что *Hymenolepis parvisaccata* Shepard, 1943 является синонимом *Dicranotaenia coronula* (Duj., 1845) а *Hymenolepis anseris* Skrjabin et Mathevossian, 1942 синонимом *Hymenolepis setigera* (Frölich, 1789).

19. Полагаю целесообразным провести подробные анатомические исследования нижеперечисленных ленточных червей, которых видовая обособленность подлежит большому сомнению: 1. *Hymenolepis rarus* Skrjabin, 1914 (или синоним *Hymenolepis teresoides*, Fuhrmann, 1906), 2. *Fuhrmaniella fausti* Tseng Shen, 1932 (или синоним *Hym. paramicrosoma* Gąsowska, 1931); 3. *Hymenolepis collaris* (Batsch, 1789) не был ли описан на основании стробилы *Sobolevicanthus gracilis* (Zeder, 1803) и сколекса *Hymenolepis compressa* (Linstow, 1892) (только яйца этого вида разнятся с яйцами *Sobol. gracilis*); 4. *Diorchis (N.) acuminata* (Clerc, 1902) (можно ли считать *Diorchis ransomi* Schultz, 1940 синонимом этого вида?)

20. В специальной части мною даны касающиеся 34 выявленных мною видов *Hymenolepididae.* синонимия, опознанные до сих пор их хозяева, частота и время их появления, согласно собственным данным, географическое размещение и локализация, а также в сокращении литература. В отношени большинства этих видов даются дополнительные описания мало известных либо совершенно неизвестных анатомических подробностей и оригинальные иллюстрации. Не затронута морфология только 4 видов: *Diorchis (D.) parvogenitalis* Skrjabin et Mathevossian, 1945, *Hymenolepis anatina* (Krabbe, 1869), *Sphenacanthus fasciculata* (Ransom, 1909) и *Fimbriaria fasciolaris* (Pallas, 1781).

ACTA PARASITOLOGICA POLONICA
Vol. IV WARSZAWA 1956

Fasciculi:

1. W. Michajłow — Cykl rozwojowy wiciowca *Astasia cyclopis* n. sp.
Цикл развития жгутиконосца *Astasia cyclopis* n. sp.
Developmental cycle of the flagellate *Astasia cyclopis* n. sp.
2. B. Bezubik — Materiały do helmintofauny ptaków wodnych Polski.
Материалы к гельминтофауне водных птиц Польши.
Materials to the helminthofauna of aquatic birds of Poland.
3. M. Wierzbicka — Wyniki sztucznego zarażenia *Cyclops vicinus* Ulj. larwami *Proteocephalus percae* (O. Müller).
Результаты искусственного заражения *Cyclops vicinus* Ulj. личинками *Proteocephalus perae* (O. F. Müller).
Results of the artificial invasion of *Cyclops vicinus* Ulj. with larvae of *Proteocephalus percae* (O. F. Müller).
4. J. Preibisch — Zmiany anatomopatologiczne wywołane u jelenia (*Cervus elaphus* L.) przez *Wehrdickmansia cervipedis* (Wehret Dickmans, 1935) Caballero, 1945.
Анатомо-патологические изменения вызванные у оленя (*Cervus elaphus* L.) паразитической нематодой *Wehrdickmansia cervipedis* (Wehr et Dickmans, 1935) Caballero, 1945.
Anatomo-pathologikal changes caused in *Cervus elaphus* L. by *Wehrickmansia cervipedis* (Wehr et Dickmans, 1935) Caballero, 1945.
5. S. Patyk — Zarobaczenie przewodu pokarmowego owiec i kóz na Ziemiach Zachodnich.
Гелминты пищеварительного тракта овец и коз.
The helmints in the alimentary tract of sheep and goats.
6. J. Ciemochowska-Mazik — Zdolność wykorzystywania skrobi przez *Entodinium longinucleatum* Dog.
Способность использования крахмала инфузорией *Entodinium longinucleatum* Dog.
The ability of Entodinium longinucleatum Dog. to exploit starch.
7. W. Ślusarski, K. Markiewicz i W. Stefański — Nowy przypadek dermatitis verminosa u psa spowodowanej inwazją larw *Rhabditis strongyloides* Schneider 1866.
Новый случай dermatitis verminosa собаки вызванный инвазией личинок *Rhabditis strongyloides* Schneider, 1866.
Sur un cas de dermatite vermineuse chez le chien provoquée par l'invasion des larves *Rhabditis strongyloides* Schneider, 1866.

Cena zł 28.—

8. *Hymenolepididae* Fuhrmann, 1907 *(Cestoda)* Parasites of Some Domestic and Wild *Anseriformes* of Poland.
Hymenolepidídae Fuhrmann, 1907 *(Cestoda)* u niektórych domowych i dzikich *Anseriformes* w Polsce.
Hymenolepididae Fuhrmann, 1907 *(Cestoda)* паразиты некоторых домашних и диких *Auseriformes* в Польше.